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THE
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ORIGINAL COMMUNICATIONS.

(Original Communications are received with the understanding that they are contributed exclusively to THE LARYNGOSCOPE.)

OBSERVATIONS ON THE DIAGNOSTIC VALUE OF THE COLD CALORIC AND THE ROTATION TESTS.*

DR. SAMUEL J. KOPETZKY AND DR. RALPH ALMOUR,
New York City.

For some time the methods of examining the labyrinthine reactions have become standardized. In the earlier period of this standardization, the otologist was much impressed with the application of these tests to the diagnosis of intra-cranial lesions, and a series of findings were evolved which were considered pathognomonic for certain given conditions within the cranium.

While the diagnoses made as the result of applying the labyrinthine tests were often exceedingly brilliant, yet these tests were found to fail in eliciting the pathognomonic responses in cases where an intra-cranial lesion was subsequently demonstrated. It followed that authoritative observers began to question the fundamental hypotheses upon which the labyrinthine syndrome had been built up.

With the results of newer data from both experimental and clinical sources at our disposal, we present in this paper a *re-valuation* of the reactions obtained by stimulating the labyrinth by rotation and with cold water.

Nystagmus: Today three postulates are the basic fundamentals in the hypothesis of labyrinthine reactions. They are held to be true.

*From the notes of a paper presented before the Section on Otology, New York Academy of Medicine, on December 14, 1923.
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We present them in detail in the light of our experience with deductions from our clinical study.

The first postulate is:

1. *It has been held that when the caloric stimulus fails to produce a reaction when the head is tilted backward, while causing a reaction when the head is in the upright position, or vice versa, it is evidence of a central interference of the vestibulo-ocular tract.*

It is assumed that the rotation tests elicit responses from all the canal mechanisms, while the caloric tests enable us to determine the function of the canals individually. For this reason. most observers test the labyrinth function by rotating the patient in the horizontal plane, thus testing both the horizontal canals, and by douching the ears, with the head placed 30 degrees forward and then 60 degrees backward, thus testing the horizontal and vertical canals individually. In addition to performing the above, we invariably rotate the patient with the head 90 degrees forward, in this way checking our caloric findings, and have as a result noted interesting discrepancies which at first led us to doubt the accuracy of our observations.

Two cases, which have been reported in detail before the Section of Otology, New York Academy of Medicine and which are published in full elsewhere*, may be cited as elucidating the point at issue.

A young girl, suffering from congenital syphilis, showed *no response whatsoever following the rotation tests.* The caloric test produced no response from either ear when the head was placed 30 degrees forward. On tilting the head backward 60 degrees, a *rotary nystagmus to the left* was obtained following douching of the right ear, and a slight, but definite *horizontal nystagmus to the right was obtained* after douching the left ear.

A young man, who had an attack of diffuse purulent labyrinthitis following an injury to the right side of his head, showed, in addition to the total deafness in the right ear, sufficient evidence from the rotary tests to lead us to believe that the semi-circular canals in the right ear were destroyed. While there was no reaction from the right ear when it was douched with the head 30 degrees forward, a perfectly normal *horizontal nystagmus to the left* appeared on tilting the head 60 degrees backward. In both of these cases, there were no spontaneous vestibular phenomena.

The findings in these cases are contradictory, in that the rotation tests show the semi-circular canals incapable of transmitting im-

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pulses to the ocular muscle nuclei, while the caloric tests belie the results of the rotary stimulation, in that they show the horizontal canals as capable of excitation and production of nystagmus.

Many observers have noted these apparent discrepancies, some attributing them to a faultiness of either their technique or their observations. Barany observed them, and stated that his theory of the caloric reaction did not properly explain such findings. Lund has observed them, and considers that such reactions are pathognomonic for, and definitely diagnostic of syphilis. Borries has reported cases which are very similar to ours, in that he also found reactions following caloric stimulation despite the failure to elicit responses by rotation. From his experiments in pigeons, wherein, following complete removal of the semi-circular canals he was still able to produce normal nystagmus by douching the external auditory canal, while no reaction could be elicited by turning, he deduced that the two reactions issued from different parts of the labyrinth. He further concluded that the cristae ampullae were not essentially necessary for the production of the caloric nystagmus, and that therefore the caloric stimulus emanated from the otolith organs in the vestibule.

When one considers the anatomical arrangement of the semi-circular canals which include the three planes of space, it becomes evident that these canals must function primarily for the perception of angular movements. We know that when a nystagmus is produced by forceful rotation, it does not change its character or direction when the head is placed in a different position. In other words, the nystagmus from rotation is constant. On the other hand, we know that the caloric nystagmus is dependent for its character on the position of the head in space. We also know that the normal person will show movements of the eyes dependent upon the position of the head, a phenomenon first described by Barany as "Gegenrollung" or counter-rotation. In view of these facts, namely, that the caloric nystagmus is dependent for its character on the position of the head in space and not upon the perception of angular movements of the body in space; that the semi-circular canals are not essentially necessary for the production of a caloric nystagmus; and since Magnus and de Kleijn have shown that "counter-rotation" phenomenon disappears after the otolith membrane has been destroyed; we are inclined to conclude from these premises that the caloric nystagmus is the result of stimualtion of the otolith organs in the vestibule.

Then again, one cannot help being impressed by the difference in the nature of the two stimuli. The rotary stimulus is one of mo-

tion, and it excites the labyrinth in such a way that the latter perceives movement about an axis. The resultant nystagmus is the endeavor to stabilize the visual field that has been disturbed by the forceful stimulation. The caloric stimulus is one of temperature, and the reaction it produces is due to the change in the density of the endolymph. The nystagmus which results is analogous to that occuring *during* rotation, in that it occurs *while there is active stimulation of the labyrinth.* When rotation is stopped, there occurs a change in the nystagmus, this being known as the *after-nystagmus.* When the endo-lymph following caloric stimulation has adjusted itself so that there are no longer differences in the density of various portions of the fluid, the nystagmus stops, and an *after-reaction,* consisting in a *rolling of the eyes toward the ear stimulated* occurs. This has been described by Karlefors. So we feel that when we compare the post-rotary nystagmus and the caloric nystagmus, we are comparing two phenomena, which, while alike in their appearance, are totally unalike as regards their production and time of origin, in that one is an after reaction, while the other is not an after effect, but a concomitant direct effect.

Finally, while the change in density that occurs in the endolymph may cause a disturbance in the canals, Maxwell feels that the disturbance in the larger mass of endolymph in the vestibule is much greater, with a consequent tension on the otolith organs, and one must look for the greater effect to be exerted in the fluid in the vestibule, rather than in the semi-circular canals.

Hitherto we have accepted Barany's explanation of the origin of the caloric reaction, and have, on the basis of his interpretation of the caloric responses, developed a system of tracts for the various canals which has led us to become too dogmatic in the interpretation of the labyrinthine reactions elicited by stimulation. Borries' experiments throw new light on the labyrinth tests, in that they offer a definite physiological explanation for the so-called paradoxical reactions, which reactions are not accounted for by Barany's theories, and by which we can more readily and more logically analyze our case reports.

Therefore, since there is definite proof that the semi-circular canals are not necessary for the production of the caloric nystagmus, since the rotary reactions may be absent while the caloric are present, and since the nature of the two stimuli are essentially different, it must be conceded that these two reactions, the "angular reactions" and the "caloric reactions" originate in different parts of the labyrinth. Therefore, not only must our interpretation of the

reactions be altered, but we must also consider as not definitely proved, the system of tracts for the individual canals. Since the caloric reaction probably emanates from the otolith organs, we cannot account for the absence of the caloric reactions as being evidence of impaired canals or tracts leading from these canals. While we, too, have observed that certain intracranial lesions cause particular caloric reactions to be absent we cannot interpret this absence as being due to an interference with the tracts leading from the *canals,* since the findings of Borries tend to show that the central fibers in the brain stem are different for the canals and the otolith organs. In the future, we will arrive at our conclusions for both diagnosis and prognosis, by attempting an analysis separately of the *angular nystagmus* and of the *caloric nystagmus,* giving to each its particular value in the estimation of the case as a whole.

2. The second postulate supposes *that a unilateral destruction of the labyrinth will result in a shortening of the duration of the after-nystagmus on turning away from the diseased side as compared with turning toward it, the ratio being about 2:1.*

Among our cases are two* wherein a unilateral destruction of the labyrinth existed, and in which the findings were not in accord with this postulate. Ruttin, Eagleton and others have made similar observations. Eagleton having termed it the "establishment of compensation". We mention this here to emphasize the importance of realizing that the labyrinth is capable of readjusting itself in a manner similar to any other system that has two organs performing the same function. Therefore, in examining a case wherein one labyrinth is not functioning, one must consider very carefully whether or not the healthy labyrinth has established compensation, and if so, to what degree. Naturally time is the great factor to be considered, but one must also consider the vitality and resistance of the individual examined.

3. *The third postulate assumes that a current away from the ampulla in the vertical canals is capable of producing twice as strong a reaction as a current toward it.* This is based on Ewalds' experiments. In other words, the results obtained are found to be opposite to those which obtain when the horizontal canals are stimulated. Clinically we have found that the findings of Ewald are true for the horizontal canals but not true for the verticals.

In examining a patient who has a destruction of one labyrinth, we know that the turning *toward* the destroyed side produces the

*Reported in Journal of Mental and Nervous Disease—Circ. March, 1924.

longer reaction, when the horizontal canals are tested. Since, in this position, the ampulla of the horizontal canal is external to its non-ampullated end, the endolymph impulse, continuing in the direction of the turning, is toward the ampulla in the canal opposite to the direction of the turning. Since this reaction is stronger than that obtained when the turning is toward the healthy side, one concludes that the current toward the ampulla in the horizontal canals is capable of producing a stronger reaction than when the current is away from it.

We have found* that the same condition holds true for the vertical canals, namely, that when a patient with a dead labyrinth is rotated with the head 90° forward, the strongest reaction is obtained when the turning is toward the dead end-organ. Since in this position, the ampulla of the superior canal is external to its non-ampullated end, and the ampulla of the posterior canal is internal to its non-ampullated extremity, and since we know that when the endolymph impulse is toward the ampulla in one vertical canal, it is toward the ampulla in the other, it becomes evident that the current toward the ampulla in the vertical canals produces the stronger reaction. Turning toward the diseased side causes the endolymph to move toward the ampulla in the opposite superior semi-circular canal and consequently toward the ampulla in the posterior canal.

From this we conclude that the endolymph impulse in the vertical canals produces the strongest reaction when its direction is toward the ampulla, thus attributing to the cristae of the vertical canals the same character of function as the cristae of the horizontal canals.

The Shortening of the Duration of After-Nystagmus. It has been demonstrated by Eagleton that in cases where there was an increase in the pressure of the fluid in the posterior fossa, a definite reduction in the duration of the nystagmus obtained after turning was found in the great majority of instances, this reduction being about 50 per cent of the total obtainable nystagmus. This diminution in the time of rotary after-nystagmus, he attributes to the impairment of the function of a mechanism situated in the cortex of the cerebellum, which governs the duration of after-nystagmus obtained by rotation.

In the several cases* wherein we found an appreciable decrease in the duration of the post-rotary nystagmus, we also noted an increase in the length of time that it took for a caloric stimulus to produce a reaction. For example, if the rotation tests show that the right labyrinth, when the ampullae are stimulated by the endolymph moving toward them, produces a markedly diminished period of after-nystagmus, it will take a longer period of time than the

approximate normal to cause a nystagmus from the right labyrinth by means of the cold caloric method. From our observations, then, it would appear that *a direct relationship exists* between the duration of the post-rotary nystagmus and the time that it required for the cold douching to produce a nystagmus. We are not inclined to accept as true the theory of Eagleton that a mechanism exists in the cerebellum for the control of this function, for the following reasons.

Magnus and de Kleijn have demonstrated that the cerebellum has no effect on either the production or the character of nystagmus. They have shown that the nystagmus following rotation occurred normally in the absence of the cerebellum. If Eagleton's contention is true, then this mechanism for the control of the duration of the post-rotary nystagmus must be a center with a definite function, and to this center we must ascribe a twofold action, one governing the capacity of the ocular muscle nuclei for the reception of stimuli, and the other controlling the amount of stimulation necessary to produce a nystagmus. We know, however, that the brain cells are remarkably specialized, each group acting for the control of one and only one function. Then again, that the caloric and the rotation nystagmus are different in type, mode of production, and time of origin in relation to the exciting stimulus, we have previously noted. In view of these factors, and in view of the relationship between the shortened nystagmus after rotation and the increase in time required for the cold caloric to produce a reaction, we are inclined to attribute this phenomenon to an interference with the retro-labyrinthine fibers to the ocular muscle nuclei, resulting in an impairment of the *force of the impulses*, rather than to an interference with a cerebellar mechanism, which, to make its activity logical, we would have to accredit with a dual function. This theory would not in any way affect the findings of Eagleton, but offers for them a more reasonable explanation, namely that the vestibular nerve fibers in the brain stem and not a center in the cerebellum are affected by the increase in pressure, and that the phenomenon that he notes is due to an impairment of the transmitted impulses.

Absence of the Rapid Component. In a case of Dr. Emil Altman's, wherein on operation, an endothelioma of the dura was found to press on both frontal lobes and invade the left frontal lobe, we were able to demonstrate the absence of the quick component following caloric stimulation, all that was obtained being a conjugate deviation of the eyes toward the side stimulated. Past-pointing and vertigo were normal. We report this as an observation only, and

do not attempt an explanation as to which portion of the brain tissue affected by the growth could have, by virtue of its destruction, produced this type of pathological nystagmus. It would seem, however, to support the theory of the cortical control of the quick component.

We have made the following observations in regard to vertigo:

1. Following rotation, the vertigo obtained from the vertical canals is of much shorter duration than that obtained from the horizontal canals.

2. While a destruction of one labyrinth will result in a reduction of the time of nystagmus on rotating away from the diseased side as compared with turning toward it, the duration of the *after-vertigo is the same for the turning in both directions.**

3. During the caloric test, vertigo is complained of after the nystagmus has been elicited.

Past-Pointing. Past-pointing is dependent upon four factors, each of which must be normal for the reaction to be performed properly.

1. The production of vertigo.
2. The presence of normal motor power.
3. A synergic action of the muscle groups tested.
4. A normal conception of the objects moving, causing the patient to point where he thinks the fixed object is now located.

If any one of these phases is disturbed, a faulty past-pointing results. Any condition wherein vertigo is absent, as in a destroyed labyrinth, will result in absent past-pointing. A disease of any portion of the motor apparatus will cause faulty past-pointing.

The primary function of the cerebellum is the synergic control of the body musculature, and we know that it exerts its action without the intervention of consciousness. The efferent channels of the cerebellum, the vestibulo-, thalamo-, and rubro-spinal tracts, end in the ventral horn cells of the spinal cord, and transmit the co-ordinating impulses of the cerebellum directly to the spinal nerves. We have then, three distinct pathways for the transmission of cerebellar impulses. A disturbance of the normal function of any one of these will result in a deviation from the normal past-pointing, since the cerebellar control of the muscles will be interfered with. With this in mind, how can we, with only clinical observations at our command, attempt to attribute to the cerebellum and its peduncles every variation from the normal past-pointing. The cerebellum proper and the afferent vestibular channels may be entirely normal, and abnormal past-pointing may still be elicited due to a lesion of

one of the efferent cerebellar or spinal tracts. The thalamic syndrome of Dejerene-Roussy wherein a slight degree of hemiataxia exists, is an excellent example of this.

The identification of definite cerebellar areas associated with special muscle actions has caused the otologist to regard the cerebellum and its afferent tracts as the offenders in every case of abnormal past-pointing. It is in the interpretation of the past-pointing reactions, with the endeavor to localize the situation of intra-cranial lesions by means of them, that one can find the real basis of the controversy between the otologist and the neurologist. From a histological standpoint, this localization in the cerebellum cannot be as distinct as that in the cerebral cortex. The cellular structure of the cerebellum is so arranged that the Purkinje cells intercommunicate with the resultant formation of large groups of cells which, while individually capable of producing simple synergia, function primarily to regulate the "patterns of movements", rather than the parts employed. So we feel that at present, we are not justified in attempting to localize a lesion from the induced past-pointing reaction, for we have no definite means of determining what portion of the cerebellum or its tracts are involved.

OBSERVATIONS.

1. We have found that, in cases of proven syphilis of the central nervous system, a definite interference with the normal past-pointing was invariably elicited upon rotary stimulation despite the absence of other cerebellar signs of either asynergia or dysmetria. This is mentioned here merely as an observation in four cases, further investigation being necessary to bring evidence sufficiently conclusive.

2. We have also noted that differences in the past-pointing may be found upon repeated examinations in the same individual.

3. If there is a disturbance of past-pointing on stimulating the horizontal canals by rotation, one usually elicits the same disturbance when the vertical canals are stimulated.

GENERAL CONCLUSIONS.

1. To the otologist, the labyrinth tests are of extreme value in determining the amount of function present in the end organ. They enable him to diagnose with a great degree of certainty the various diseases of the labyrinth per se and act as a guide in determining the time and mode of operation on the end organ in suppurative processes.

2. In neurology these tests have their place, but their value is more or less limited because of our present lack of definite histo-

logical evidence to verify and clarify our clinical observations and substantiate our theories.

Lesions below the tentorium, when they involve the vestibular pathways, will produce disturbances in the labyrinth reactions which are definite enough to be diagnostic. These cases, however, with the exception of primary eighth nerve tumors, will give other signs which are of diagnostic value. Cerebellar lesions, when they are large enough, will evince themselves by pressure on the brain stem, causing interference with the transmission of impulses along the vestibular tracts. Off-past-pointing following stimulation, in the absence of other neurological signs, is of little value in diagnosing these conditions, as there are usually present more marked disturbances of co-ordination, such as adiadochokinesis, a positive Romberg or Babinski's dysmetria reactions, which would label the tumor as cerebellar in origin much more easily than does the past-pointing test. We feel, therefore, that where we get a past-pointing in the wrong direction following stimulation, and where the spontaneous past-pointing is normal, we are not justified in our present state of knowledge in endeavoring to render an opinion as to the situation or cause of the lesion.

In supratentorial tumors, the tests are only of negative value. While it has been found that rapid invasion of the frontal and temporal lobes may produce disturbances in the pointing reactions, the effects are too transient to enable us to consider them as diagnostic evidence of disease in these parts.

We feel, however, that every case of intra-cranial lesion, wherever possible, should be subjected to oft repeated labyrinth tests for the purpose of recording gradual changes in the reactions. In those cases where we are fortunate enough to verify the presence of tumor, whether by operation or autopsy, and exceedingly careful gross and microscopic examination of the portions of the brain tissue involved by the growth should always be made with a view of determining a histological explanation for the disturbed labyrinth responses. Too often has the otologist failed to establish or verify a diagnosis of brain tumor where the tests should have given lucid evidence of the disease. Very rarely could this be attributed to faulty technique or careless observations. We are at present groping about in a maze of clinical observations, trying to determine the cause from the effect, without having even tried to explain pathologically how and when, if at all, the cause produces the effect. We have probably been treating this problem in an erroneous manner. Until we can find a definite pathological explanation for the

abnormal variations of the labyrinth reactions, until we can with certainty attribute to various portions of the central nervous system the control of these reactions, until that time will there be constant quibbling, constant controversy and an everlasting dispute as to the value of these tests.

SUMMARY OF OBSERVATIONS.

1. We can corroborate the findings of Borreis in what he calls "paradoxical reactions", and further believe with him that the caloric stimulus and the rotary stimulus produce their reactions by affecting different parts of the labyrinth. We feel that the caloric nystagmus and the rotary nystagmus are different from each other both as regards character and point of origin.

2. After a period of time, more or less variable, there occurs in a patient with only one functioning labyrinth a readjustment and compensation on the part of this labyrinth, analagous to the compensation which takes place in any other part of the body that has two organs performing the same function.

3. We cannot agree with Ewald's hypothesis that the current away from the ampulla in the vertical canals is capable of producing a stronger reaction than the current towards it, for our clinical observations do not only fail to bear it out, but tend to show that the reverse is true. From our findings, the cristae ampullae in all the canals react to endolymph movement in the same manner; namely, when the current is toward them, the reaction is stronger than when the current is away from them.

4. There apparently exists a direct relationship between the duration of the after nystagmus elicited by rotation and the time required to produce a nystagmus by the caloric method.

5. We have been able to demonstrate the absence of the quick component of nystagmus in a case of frontal lobe tumor.

6. While destruction of one labyrinth diminishes the period of after vertigo, there is no difference to be noted in the duration of vertigo on turning away from the diseased side as compared with turning toward it. What holds true for the duration of nystagmus following the destruction of one labyrinth, does not hold true for the vertigo.

7. During caloric stimulation, vertigo appears after the nystagmus has been elicited.

8. From the cases we have examined, it appears that a syphilitic involvement of the central nervous system causes faulty past-pointing after labyrinth stimulation despite the absence of spontaneous signs of asynergia or dysmetria.

9. If there is a disturbance of past-pointing elicited by stimulating the horizontal canals by rotation, one usually elicits the same disturbance when the vertical canals are stimulated.

10. We feel that, at present, no definite conclusions can be drawn from induced past-pointing where the spontaneous pointing is normal.

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TREATMENT OF OPTIC NERVE INVOLVEMENTS AS DETERMINED BY OPTIC CANAL RADIOGRAPHS.

Dr. Leon E. White, Boston, Mass.

In a recent anatomical study at the Harvard Medical School the optic canals were found to vary in size from 4 to 6.5 mm. and in shape from the usually circular to various degrees of ovalness; so the question naturally arose as to whether or not such variations would explain why some nerves become involved and others escape.

It was also found that the smaller the canal the more extensive the pneumatization around it. Therefore, it seemed that there would be greater liability of nerve involvement in a relatively small pneumatized canal than in a larger one less extensively pneumatized. The mucosa of the para-nasal sinuses when infected undoubtedly offers to the more extensively pneumatized canal a larger area for infection to reach the optic nerve. The bony walls of these excessively pneumatized canals were also found to be thinner, thus leaving but a slight barrier to infection. It seems logical to conclude that when infection invades one of these small osseous canals it requires but moderate swelling to produce a constriction so severe that nerve degeneration would ensue. The optic canal is usually circular, a few are flattened on top and in these the pneumatization is pronounced in the lesser wing above the canal. When the canal is oval (a rather rare abnormality) it means pneumatization both above and below it. If triangular (a very infrequent shape), there is an extension also of the pneumatization into the bridge formed by the lateral root of the lesser wing of the sphenoid. Any irregularity in the contour of the canal is usually associated with a diminution in its caliber. Canals under 4.5 mm. are, as a rule, irregular, yet enough circular ones are found to demonstrate that the shape is not always an indication of the size.

The conclusions from this anatomical study are that both the shape and size of the canals are dependent largely upon the amount of pneumatization around them.

The next step to determine is whether the canals are below normal in patients with optic nerve disturbances. Fortunately it was possible to have the canals filmed in twenty-five such cases and for

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comparison a similar number made of normal individuals. The canals were then carefully measured and the results tabulated.

Heads differ so much in contour that it is extremely difficult to obtain a position where the correct shape and size of the canal will appear on the film; in fact, the first canals all appeared small and oval. Later it was discovered that if the skulls were held up to the light so that the full diameter of the canal could be seen, the line of vision was always somewhere through the lower outer quadrant of the orbit. When viewed from the other quadrants the canal usually appears narrowed or flattened. This did not become apparent until a number of cases were filmed, so that much of the work had to be repeated. It is not always possible, even now, to get the image of the canal in the lower outer quadrant on the first or even second attempt. The position as worked out by Doctor A. S. Macmillan, is as follows: The patient lies with one eye at a time over the plate, the nose and the malar bone touching it, while the forehead is about a finger's breadth away. The ray penetrates from the region of the posterior parietal protuberance of the opposite side.

To establish the normal size and shape of the canals twenty-five doctors and attendants from the Infirmary volunteered as subjects, and fifty fairly good radiographs were obtained. Of the fifty radiograms in this normal series five were slightly oval and the average diameter was 5.35 mm. The average diameter of the canals in the twenty-five cases of optic nerve involvements was 4.68 mm. Twenty-six of these canals were oval. This makes practically 50 per cent oval as against 10 per cent in the normal series. There was about ½ mm. difference between the vertical and horizontal diameters in the optic nerve series as contrasted with about 1/3 mm. in the normal series. There was 2/3 mm. difference between the canals in the normal and optic nerve cases. In nineteen of these twenty-five oval canals the optic nerve was involved. Of the twenty-four round canals there was involvement of the nerve in twelve. In the nineteen oval canals with optic nerve involvement five were bilateral; twelve were operated upon; one recovered without operation; and in the other (unoperated upon) there was no improvement. Of the ten patients with round canals, one recovered without operation; six had intra-nasal operations; and in three the tonsils were removed.

Large round canals are frequently found in both acute and chronic cases. In these it is thought the neuritis is due to bacteremia or toxemia—usually teeth or tonsils—rather than to direct extension from infection in the sinuses. Large canals, let me interpolate, generally contra-indicate accessory sinus surgery.

Is there any relationship between the size of the canals and the severity of the neuritis; and if so, what bearing should this relationship have on treatment. The data from the following cases will, I believe, answer these queries.

Thirty-six cases with optic nerve disturbance are cited in chronological order, briefly stating the duration, vision, size of canals, method of handling and results. The cuts illustrate some of these canals. It may be of interest to note that all these cases, the earlier ones dating back nearly ten years, have been checked up at frequent intervals.

Case 2: Bilateral. 10 days' duration. Vision 10/100 left with some blurriness in right. Fundi negative. Optic canals 5 mm. Middle turbinate removed and sphenoid opened. Improvement rapid. Normal vision in two weeks. This patient would have probably recovered under local treatment as the canals were practically normal but at that time we were unable to determine this. This case illustrates the type where one may with safety delay surgical intervention.

Case 4: Bilateral. Duration six weeks. Vision 2/200. Marked optic atrophy. Canals 4x5 mm., i. e., oval. Both middle turbinates removed and sphenoids opened. No further loss of vision; slight improvement. Earlier operation would probably have been of greater benefit.

Case 6: Unilateral. 5 days. Vision nil. Blurring of edges of disc. The canal on the unaffected side was 5 mm., affected side 4.5 mm. Septum resected, middle turbinate removed and sphenoid opened. Ultimate vision 20/20. This case with a rather small optic canal indicated operation. The process was unusually acute and there would probably have been marked impairment of vision had not active surgical treatment been instituted.

Case 7: Bilateral. Duration three weeks. Vision, light perception. Canals 4.5x5 mm. Marked neuritis with blurring of edges of discs. Usual intra-nasal operation, i. e., the removal of the middle turbinate, opening of sphenoid and posterior ethmoid cell. Result, vision 20/30 with some pallor of the nerve.

Case 8: Bilateral. Duration six weeks. Vision, light perception right, fingers three feet left. Canals 4x4.5 mm. Blurring of edges of discs and marked neuritis right. Removal of middle turbinate, opening of right sphenoid and resection of septum. Normal vision. This case with its small oval canals is the type which seems to be greatly benefited by operation.

Case 9: Both eyes affected but not simultaneously. Duration, right. five weeks; left, one week. Vision 20/200 right, 20/40 left. Marked engorgement of fundi. Canals 4x5 mm. Usual intra-nasal operation on both sides and left antrum opened. Vision normal. This case with oval canals considerably below the normal seemed greatly benefited by the operation.

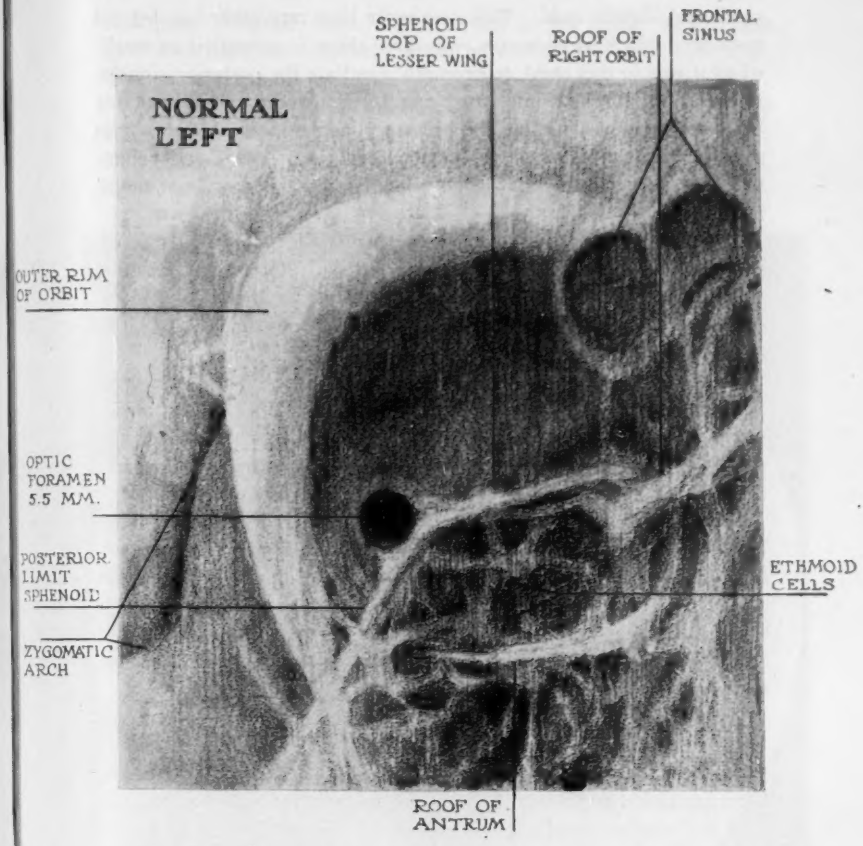
Case 13: Bilateral. Duration four months. Vision 20/200. Progressive loss. Temporal pallor. Canals 3.5x4 mm. Usual intra-nasal operation. Vision 20/100. The smallness of these canals was probably a factor in the loss of vision and had there been a more acute process, much more destruction would have resulted. The operation was done to prevent further impairment and in this it succeeded.

Case 23: Unilateral. Duration seven days. Vision nil. Edges of disc slightly indistinct. Canals 4.5x5 mm. right and 5x5.5 mm. left. Usual intra-nasal operation. Ultimate vision 20/20—. The vision returned slowly and there was some pallor of the nerve. The affected eye was (as is usual) on the side of the smaller canal.

Case 24: Unilateral. Eleven days' duration. Vision nil. Disc hazy and indistinct. Canals 5 mm. Usual intra-nasal operation. Fingers at two feet. Marked optic atrophy. The operation was of but slight benefit even though done within eleven days. This case is unique in that over three years after the loss of vision in the right eye, the left eye became affected although not to the same extent. There was nothing in the nose to suggest operation, especially as the optic canals were practially normal. The tonsils, which showed evidence of infection, were removed. Little, if any, benefit resulted. The case was thoroughly investigated but nothing in her physical, neurological or serological examination offered by explanation for the loss of vision.

Case 25: Unilateral. Nine days' duration. Light perception. Disc somewhat blurred. Canals 4.5 mm. Usual intra-nasal operation. Normal vision with some pallor of the nerve. In such a severe neuritis associated with small canals the operation was, I believe, of marked benefit. Had it been delayed, the resulting slight pallor would undoubtedly have been greater. The determination of the size of the canals greatly assists one in deciding between operative procedure and palliative treatment.

Case 26: Unilateral. Duration five days. Vision fingers one foot, fundus normal. Canals markedly oval, 4x5.5 mm. Usual operation. Vision 20/40 with some temporal pallor. The oval



canals probably indicated excessive pneumatization but one might have treated such a case had the size of the canals been known.

Case 27: Bilateral. Three and one-half years' duration. Vision nil. Complete optic atrophy. Canals 3.5x4 mm. No treatment. Permanent and complete blindness. These canals were the smallest measured and slightly oval. It would have been of inestimable value at that time had the importance of filming the canals been comprehended. Practically all my data had been accumulated before this patient was seen and when referring her to Doctor Macmillan, the radiologist, I remarked that if her canals were not the smallest of any filmed I would scrap my winter's work on this subject. It was gratifying to learn that they were both extremely

small and slightly oval. This case more than any other has led me to believe that it is necessary, wherever there is a neuritis as marked as it was in this child, to promptly ventilate the posterior sinuses, unless some other definite cause can be discovered. I did not see her until some years after she became blind but was able to obtain a very complete history (see previous reports of case) and believe that with our present knowledge, some of her vision at least might have been saved.

Case 28: Bilateral. Recurrent. Vision 20/200. Fundi normal. Canals 4x5.5 mm. Local treatment. Vision 20/30—. The poor general health and the rapid improvement under treatment contra-indicated intra-nasal surgery. The canals were markedly oval, there being 1.5 mm. difference between the vertical and horizontal diameters. The area of the canals was but slightly below normal. There have been occasional slight recurrences. This case is of interest showing that the nerves are susceptible to disturbances in the nose, the unusually marked ovalness indicating extensive pneumatization. The size of the canals, however, favor recovery.

Case 31: Unilateral. Three days' duration. Fingers three feet. Edges of disc practically obliterated. Small blood vessels engorged. Canals 5 mm. Usual intra-nasal operation. Vision 20/20 with some temporal pallor. This case was unusually acute and although the canals were of nearly normal size, operation seemed to be indicated. Had it been possible at that time to determine the size of the canals, one might have waited longer.

Case 33: Unilateral. Duration three weeks. Vision fingers six feet. Temporal pallor of disc. Canal on affected side 4x5 mm.; on the unaffected side 4.5x5.5 mm. Usual intra-nasal operation. Ultimate vision 20/30—. As is usual, the affected side was the one with the smaller canal. The ovalness of the canals was also pronounced.

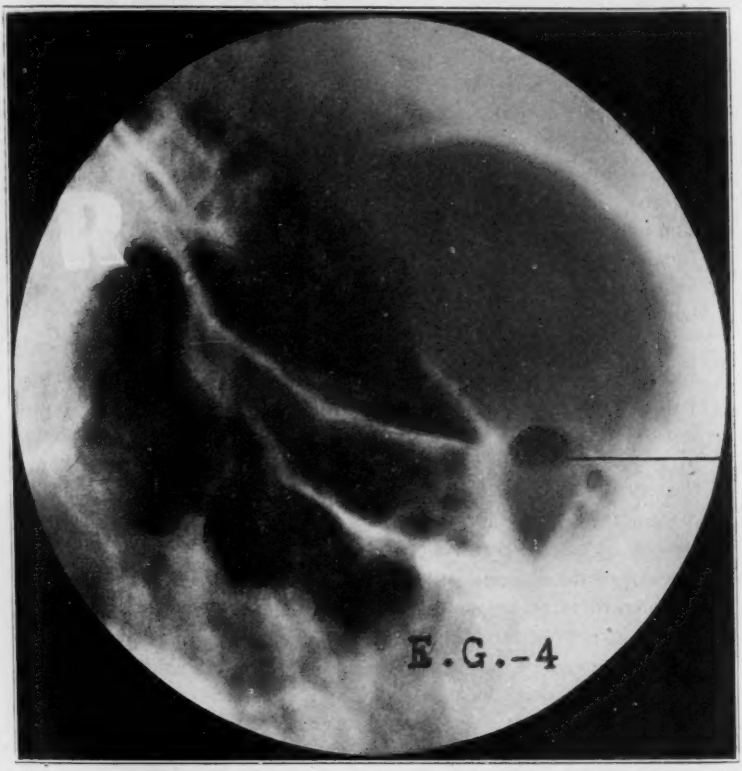
Case 34: Unilateral. Ten days' duration. Vision, shadows. Edges of disc indistinct. Canals 4.5 mm. Removal of middle turbinate and tonsils. Vision 20/30.

Case 36: Unilateral. Duration ten days. Light perception. Edges of disc blurred. Canals 4x4.5 mm. Usual intra-nasal operation. Vision 20/30 with temporal pallor. The canal of the other eye was one mm. larger in both vertical and horizontal diameters. This case again seems to demonstrate the susceptibility of a small canal and the necessity for ventilation of the posterior sinuses.

Case 38: Unilateral. Duration three weeks. Vision 20/100. Blurring of edges of disc and choriditis. Canals 5 mm. Local

treatment. Normal vision. The filming of the canals in this case gave assurance that recovery could be expected without operation. This is the type of case that usually recovers spontaneously.

Case 41: Unilateral. Duration two weeks. Vision 2/200. Canal 4.5x5 mm. Fundus normal. Local treatment. Vision 20/30—. The canal of the unaffected side was round and one-half a millimeter larger. The filming of this canal led me to expect recovery



even though the canal was somewhat below normal size. The age of this patient (67) also rather contra-indicated operation. Here again the neuritis was on the side with the smaller canal.

Case 42: Bilateral. Ten weeks' duration. Vision, fingers at seven feet. Fundi negative. Canals 4x5 mm. Refused operation. But slight temporary improvement under local treatmtnt, i. e., fingers at thirteen feet. Six months later vision dropped again to

seven feet. These small oval canals were probably a factor in the loss of vision and I believe had the patient consented to the usual intra-nasal operation he would have been benefited.

Case 44: Unilateral. Two months' duration. Vision 12/20. Fundus normal. Canals 5 mm. Local treatment (tonsils removed later). Normal vision. This mild case with normal canals contra-indicated any intra-nasal surgery.

Case 45: Unilateral. Two weeks' duration. Vision nil. Disc edges blurred, definite papillitis. Canal 4x5 mm. Intra-nasal treatment. Diseased tonsils removed. Vision 20/30 with some temporal pallor. There was no marked blocking of the posterior sinuses. The neuritis, as usual, was on the side of the smaller canal. The canal of the other side was round and 5 mm. in diameter.

Case 46: Bilateral. Five years' duration. Recurrent. Vision 20/200. Partial optic atrophy. Canals 5 mm. Resection of septum and removal of diseased tonsils. Vision 20/100. The normal canals seemed to indicate toxemia rather than any direct accessory sinus infection. The removal of the diseased tonsils it is hoped will eliminate the focus responsible for the recurrent attacks.

Case 47: Unilateral. Duration four days. Fingers at four feet. Fundus normal. Canal 4.5 mm. Diseased tonsils removed. Normal vision. The diameter of the canal on the affected side was 1 mm. less than that of the other side. There was no evidence of blocking of the accessory sinuses so they were not disturbed. Here again the neuritis was on the side of the smaller canal.

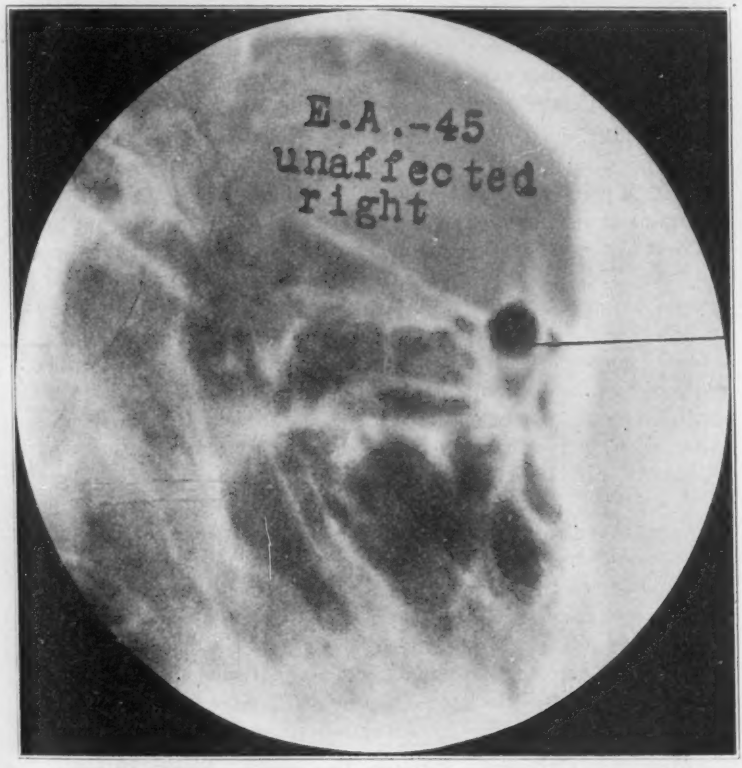
Case 48: Bilateral. Duration ten years. Vision 10/200. Optic atrophy. Canals 5.5 mm. Removed diseased teeth and tonsils. The accessory sinuses appeared normal. This seemed to be a case where the marked infection in the teeth produced a toxic neuritis.

Case 49: Unilateral. Duration six weeks. Vision 20/70. Edges of disc blurred. Canal 5 mm. Septum resected, middle turbinate removed. Vision 15/30—. Although this case was improving when operated upon, there was so much blocking by the middle turbinate and septum that these needed correction irrespective of the neuritis. The tonsils likewise were diseased. Had there been no definite focus of infection this case with practically normal canals would not have been operated upon.

Case 50: Bilateral. Duration nine months, progressive. Light perception in one eye, 20/70 in the other. Discs show some temporal pallor. Canals 5 mm. Usual intra-nasal operation on both sides and removal of tonsils. Vision unimproved. As this and the

following cases have not been previously reported a somewhat more detailed description seems indicated.

W. A., age 33, was referred from the Eye Clinic on April 6, 1923, with diagnosis of retrobulbar neuritis both. The vision in the right eye had been failing for nine months and in the left eye six months. She was referred by Doctor Clay of Atlanta, Ga., to Doctor Harvey Cushing on the supposition that the loss of vision might



be due to a pituitary tumor. After investigating her Doctor Cushing wrote me: "I do not believe she has a brain tumor though it is conceivable that there may be a suprasella growth which has given bizarre symptoms". This case was not typical of either accessory sinus or pituitary blindness. She was very anxious to take every possible chance for relief, so that in spite of the fact that the optic canals were practically of normal size, the usual intra-nasal

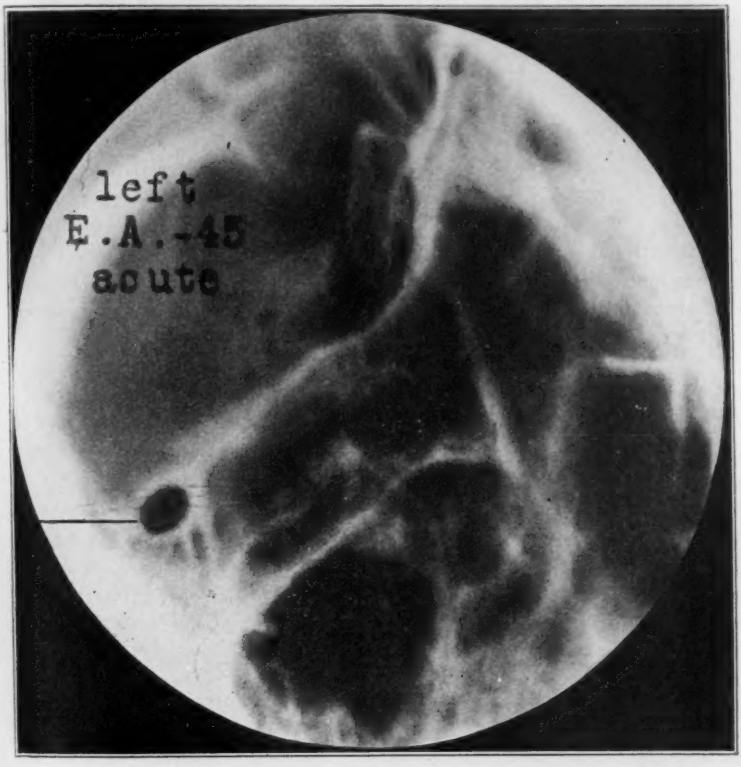
work was done. It is true that there was considerable blocking of the nose by hypertrophied middle turbinates and the tonsils showed some evidence of disease. The patient's health two months after operation was reported better and the "dreadful headaches" gone. The normal size of the canals bears out the belief previously expressed that in such cases accessory sinus surgery is valueless as far as the relief of the amblyopia is concerned. Since this writing I have learned that the vision in the better eye had recently failed rapidly and that on September 21, 1923, a suprasella tumor was removed by Doctor Dandy of the John Hopkins Hospital. This bears out the previously expressed opinion that the loss of vision was in no way associated with the accessory sinuses.

Case 51: Bilateral. Duration nine months, progressive. Light perception in one eye, 15/60 in the other, slight temporal pallor. Canals 6 mm. (the largest with one exception in the series). Usual intra-nasal operation on both sides, resection of the septum and removal of tonsils. Vision continued to fail and in three months was 4/200. This case, W. A. W., age 32, was referred by Doctor Harvey Cushing on April 6, 1923, with the statement that he found nothing in the way of a brain tumor to account for the loss of vision. The patient was in good general health and had been carefully investigated but nothing discovered to account for the gradual loss of vision. This had commenced to fail in the right eye nine months previously and when seen there was only light perception. The vision in the other eye commenced to fail two months ago. There was a marked deflection of the septum with blocking of the posterior sinuses by enlarged and degenerated middle turbinates. The tonsils showed some evidence of infection. This case, like the preceding one, did not offer much hope of improvement but was of such a nature (progressive loss of vision) that an attempt at relief seemed advisable. No benefit resulted from the opening of the sinuses and not even the progressive loss of vision was checked as it seemed to be in the preceding case. These two cases (50-51) convinced me that large canals contra-indicate intra-nasal surgery.

Case 52: Unilateral. Duration two weeks. Vision 20/100—. Canals 5 mm. Fundus normal. Abscessed tooth extracted. Local treatment. Normal vision. A. E. S., age 35, was referred by Doctor Cheney on May 8, 1923 with diagnosis of retrobulbar neuritis left. The septum was deflected to the opposite side with compensatory hypertrophy of the left middle turbinate. On filming the teeth there was found to be an area of rarifaction about one of them and on its removal it was found to be badly diseased. It was

felt that with normal canals the case should recover without surgical intervention, as it promptly did, with normal vision in six weeks.

Case 53: Unilateral. Duration two weeks. Vision 20/200—. Fundus normal. Local treatment. Vision 20/20. D. C., age 23, referred from the Eye Clinic on May 17, 1923, with diagnosis of retrobulbar neuritis, right. Although the canals were rather small, the neuritis was mild and the case progressed so favorably that



there was no indication for intra-nasal surgery. There was no special blocking of the nose and the tonsils had already been removed.

Case 54: Bilateral, one eye many years, the other of six weeks' duration. Vision fingers at two feet. Discs pale. Canals 5.5 mm. Abscessed teeth extracted. Vision in recently affected eye 20/50—, the other unimproved. E. DuB., age 52, referred from the Eye Clinic with diagnosis of optic atrophy, right, retrobulbar neuritis,

left. The canals being of normal size the sinuses were not ventilated. Diseased teeth were probably the source of the neuritis and prompt improvement followed their removal.

Case 55: Unilateral. Duration three months. Vision 20/40, fundus normal. Canals 4.5 mm. Resection of the septum and removal of abscessed teeth. Vision normal. E. T., age 30, referred from the Eye Clinic on May 4, 1923, with diagnosis of retrobulbar neuritis. The neuritis was rather mild and although the canal was somewhat below normal, there seemed no indication for opening the sinuses. The septum was obstructive and needed correction. The operation seemed to be of distinct benefit.

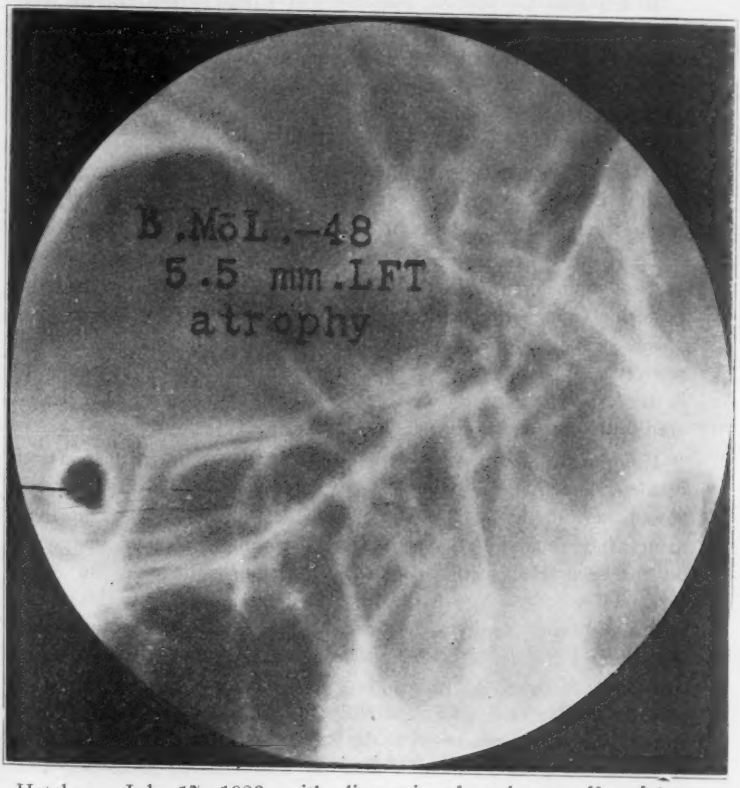
Case 56: Unilateral. Duration three weeks. Vision 20/60. Fundus normal. Canals 6x5 mm. Local treatment. Normal vision. G. N. B., age 37, referred by Doctors Cheney and Crockett on May 31, 1923, with questionable diagnosis of retrobulbar neuritis, right. Pyorrheal pockets and abscessed teeth were discovered in radiographic examination and recovery promptly followed the elimination of these foci. This case leads one to conclude that with a normal canal the source of the infection is probably not in the accessory sinuses. The peculiar point in this case is that the vertical diameter of both canals was greater than the horizontal, the only one in the series showing this abnormality. Another peculiar feature was that the left (the unaffected side) was smaller than the right. The general statement that the smaller canal is always the one affected only holds true when the canals are below the normal size.

Case 57: Unilateral. Recurrent for some years. Vision 20/40—. Fundus negative. Canals 4.5x5 mm. Removal of abscessed teeth. Vision unchanged. C. R. W., age 50, referred by Doctor Hatch on June 8, 1923, with diagnosis of recurrent retrobulbar neuritis, left. This patient had had occasional periods of blurriness of vision for some years with gradual loss. There seemed no evidence of obstruction to the sinuses. Abscessed teeth were found and it is hoped their removal will prevent recurrence. Time enough has not yet elapsed to know the final outcome.

Case 58: Bilateral. Duration six months. Vision 4/200. Fundi show temporal pallor. Canals 5x5.5 mm. Tonsils removed. Vision 20/60 right, fingers (4 feet) left. C. N., age 19, was referred by Doctor Verhoeff from the Eye Clinic on June 13, 1923, with diagnosis of retrobulbar neuritis. The physical and neurological examinations were negative. There was some question of wood alcohol or arsenic poisoning. The tonsils were diseased with enlarge-

ment of the cervical glands. Improvement followed their removal. The neuritis, as one would expect from the normal size of the canals, was probably toxic. There was no evidence warranting the opening of the accessory sinuses.

Case 59: Unilateral. Duration two years. Vision nil. Disc white. Canal 6x6.5 mm. Removal of diseased teeth. No improvement. H. L., age 50, was referred from the Eye Clinic by Doctor



Hatch on July 17, 1923, with diagnosis of optic atrophy, right. This case was for diagnosis as nothing could be expected in the line of treatment, there being complete atrophy of the nerve. The blindness came on within four weeks two years ago and has never changed. The optic canal of the affected side was the largest in this series, irregular in outline and apparently deficient in the lower outer quadrant. It seems probable that something (possibly

some benign growth) produced enough pressure on the nerve at this point to produce atrophy. The canals in Case 51, which were also abnormally large, suggested some new growth as there was some irregularity and deficiency in their contour.

SUMMARY OF THE FINDINGS IN 36 CASES OF OPTIC NERVE INVOLVEMENT.

In ten cases the vertical diameter was 4 mm. or less and all were oval. Two of these were benefited but slightly, if at all, by operation. One unoperated case had complete optic atrophy. Another refused operation and was unimproved. Four cases improved greatly after the opening of the posterior sinuses but there remained marked temporal pallor. One required a tonsil operation and the remaining case, unoperated upon because of poor general health, has had frequent recurrences. These were, by far, the most serious cases in the series.

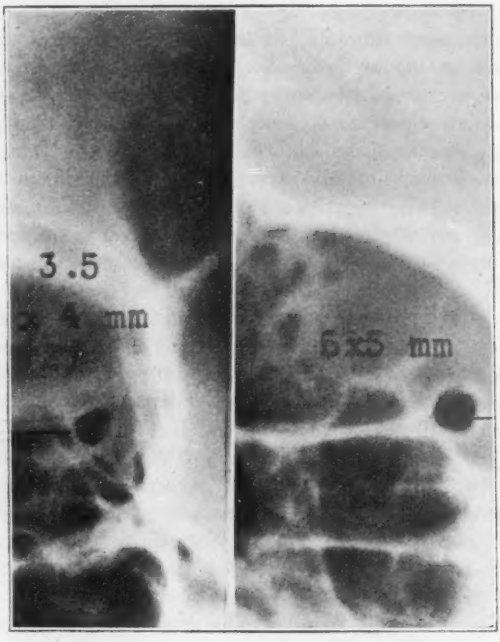
There were ten cases with canals approximately 4.5 mm. in the vertical diameter and of these but three were oval. Four had the posterior sinuses opened and all recovered with practically normal vision. Five had teeth or tonsils removed and all these made good recovery. The remaining case recovered under local treatment. It is interesting to note that in these 4.5 mm. cases, every one recovered with practically normal vision.

There were eleven cases with optic canals 5 mm. in the vertical diameter and of these but two were slightly oval. In three *chronic* cases where the etiology was in doubt one showed marked improvement after removing the tonsils. A septum and tonsil operation on the second was followed by slight improvement. The third case, with progressive blindness, was temporarily improved in health and relieved of severe headaches but later had a brain tumor removed. Four *acute* cases had the posterior sinuses opened; normal vision in three and but slight improvement in the fourth. The neuritis in this case was apparently not of nasal or dental origin. Three *acute* cases recovered under local treatment. The remaining case made a good recovery following the removal of tonsils and middle turbinate. Of the eight acute cases seven recovered with normal vision, and in the obscure eighth case tabes or multiple sclerosis is suspected.

There was one case with canals 5.5 mm. in diameter. In one eye there was optic atrophy of many years' duration; the other eye, of six weeks' standing, improved rapidly after the removal of abscessed teeth.

There were three cases with canals abnormally large, i. e., of 6 mm. One of these, a case with progressive loss of vision, continued to fail after the sinuses were opened and the tonsils removed. The neuritis was probably not of nasal or tonsilar origin, possibly pituitary.

In the second case the vision returned to normal after the removal of the foci of infection in the mouth. The third case, untreated, had complete optic atrophy of two years' duration, probably from abscessed teeth.



Further analysis of this data reveals that in the ten cases with canals of 4 mm. or less diseased teeth were extracted in one and in another the tonsils were removed. Of the ten cases with canals of 4.5 mm. five had either infected teeth or tonsils and the removal of these undoubtedly played an important part in the recovery. Thirteen of the fifteen cases with canals of 5 mm. or over had teeth or tonsils removed. These figures greatly surprised me as I finished tabulating them, although I had felt for some time that large canals

were not usually associated with cases requiring operations on the accessory sinuses.

The optic canals of the same individual were occasionally found to differ in size. In the thirty-six cases of optic nerve disturbances this difference was found eleven times. In the nine cases with canals below normal the affected eye was always on the side of the smaller canal, while in the two cases with canals abnormally large it was on the side of the larger canal, i. e., the eye affected was always on the side showing the greater divergence from the normal.

The conclusion of a preceding article still seems equally appropriate for this one:

"If future cases substantiate the findings in those already studied, it will mean that a canal of 4 mm. or less in a case of severe optic nerve involvement indicates the necessity for immediate ventilation of the posterior sinuses to prevent permanent atrophy, unless some other definite focus can be found. A 4.5 mm. canal gives greater leeway for study and investigation. Optic atrophy is less to be feared. A 5 mm. canal would probably recover from almost any *acute* attack either spontaneously or under local treatment. Then if some focus of infection is found, diseased teeth or tonsils for instance, it should be removed to prevent recurrence."

CONCLUSIONS.

The optic canal is normally circular and approximately 5.5 mm. in diameter. It may vary, however, from 3.5 to 6.5 mm. Excessive pneumatization about the canal causes distortion and narrowing, thus rendering it vulnerable. The size and shape of the canal can be determined by *careful* radiography. The data up to the present indicates that there is great danger of permanent impairment of vision whenever a severe neuritis occurs in canals abnormally small, while with the same impairment of vision in a normal canal spontaneous recovery may be expected. In the chronic conditions the neuritis is thought to be toxic from some focus, such as teeth or tonsils. Neuritis, either acute or chronic, in the normal or abnormally large canals seems to be usually of extra-nasal origin.

This, if it proves true, should be of great importance in making a differential diagnosis between intra-cranial, multiple sclerosis, luetic and accessory sinus cases. While it is, of course, possible for any infection to reach the nerve through the system either by bacteremia or toxemia, the writer feels that canals of normal size are not especially vulnerable and that either local treatment or the removal of some definite focus of infection is the more advisable method rather than ventilation of the sinuses.

AN OPERATION FOR THE CORRECTION OF ELONGATED AND HUMPED NOSES.

Dr. J. D. Whitham, New York, N. Y.

An operation to improve the appearance of a nose is a bold effort to defeat the "destiny which shapes our ends", utilizing the knife and chisel to improve on nature "rough hewn" mistake. The writer feels that cosmetic efforts should only be applied to gross disfigurements and then only when the deformity causes a definite handicap in business or through mental worry and embarrassment has actually driven the patient to seek relief. In all cases the patient should be enthusiastic about having the nose corrected not driven to it by the persuasive powers of friends or the physician.

Probably the most frequent type of unsightly nose is the long pendulous form. The pendulous portion does not contain septal cartilage, but is formed by an overdevelopment of columnar cartilage, alar cartilage, fibro-adipose tissue and skin and it is only by the removal of this redundant portion that a satisfactory correction will be obtained. The mere removal of a wedge of septal cartilage is not sufficient to correct the majority of elongated noses. The pendulous nose is usually a humped nose and the operation now to be described is an easy simple method of removing both of these defects. The operation is easy because the field is open at all stages. For this reason the correction is much more likely to be complete than is the case with the much more difficult intra-nasal method. The operation is performed under ether by the intra-tracheal method. Although local anesthesia could be used, it is not the best way. The eyelids are covered with sterile vaselin and a sterile bandage. A post-nasal plug is inserted. The skin of the nose, the vestibule, the cheeks and upper lip is coated with one half strength tincture of iodin, which is removed in two minutes with alcohol. A horizontal incision is made through the columna nasi at its point of attachment to the upper lip and this structure is separated throughout its length from the edge of the septal cartilage as described by Gilles in his operation for cartilage implant for saddle nose.

The columna nasi, now free except for its attachment at the tip of the nose, is tilted up and the skin overlying the bridge

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and sides of the nose is separated subcutaneously by straight blunt pointed scissors and doubled edged knife. This maneuver permits the skin to be partly retracted upward thus exposing the hump, which is removed by scissors, chisel and rasp. Plenty of time should be taken to do this completely as the tendency to remove too little is a strong one. It now remains to shorten the long tip of the nose. A fairly large quadrilateral piece of tissue is removed from the under surface of the tip of the nose. This piece consists of a small triangular section from each alar cartilage and fibro-adipose tissue. The columna nasi is now turned back into its original position and if the correction is not complete a small piece of triangular cartilage may have to be removed.

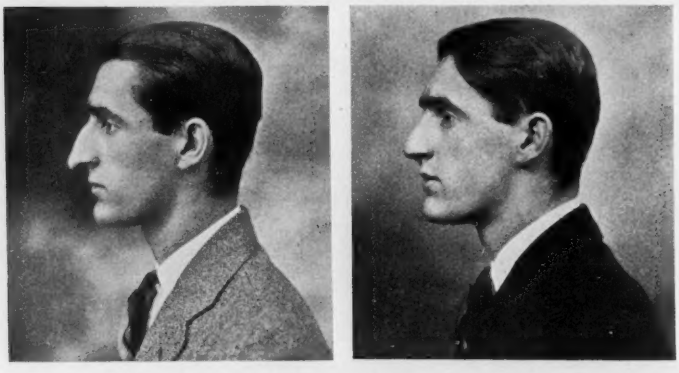

Fig. 1. Patient A. S. Appearance before operation.
Fig. 2. Patient A. S. One month after operation.

If the wings of the nose still droop down too far, it now remains to trim them with a sharp knife by excising from the edge of each ala a triangular piece of tissue. This is done by making a horizontal incision through each ala, the two incisions approaching each other mesially until separated by a distance exactly equal to the width of the columna nasi. The edges of the alae are now turned under with accuracy and sutured to the skin of the nasal vestibule. A portion of columna is now excised and the stump is sutured into place by silk. The edges of the newly formed columna are also sutured to the septal membranes on each side. Each nostril is lightly packed with cotton and vaselin. No other dressing is required but for a few hours cold compresses over the nasal bridge are possibly of

benefit. The cotton should be changed daily and the stitches removed about the fifth day.

The last steps of the operation require precision, but are certain to be successful if carefully planned. The only scar remaining is one about ⅛ inch long on the under surface of the columna which is absolutely invisible.

The illustrations show a case satisfactorily operated on by this method.

34 East 61st Street.

A TYPE OF ENUCLEATOR THAT ISOLATES THE TONSIL AND ITS CONTENTS FROM THE MOUTH AND PHARYNX DURING TONSILLECTOMY.

Dr. Nolton Bigelow, Providence, R. I.

During tonsillectomy, as usually performed, serum, blood, pus and caseous plugs are extruded from the tonsil into the mouth and pharynx. It is self-evident that this septic material should neither be swallowed nor inhaled, particularly the latter, in view of the possibility of lung abscess. Though in nowise minimizing the prophylactic value of sponging or suction, as ordinarily employed, it is, nevertheless, a fact that "the beans have been spilled" before these measures come into play. The instruments herein presented attack this problem directly, in that they completely isolate the tonsil and its contents from the mouth and pharynx.

The basic principle is the same in each instance; namely, a cup attachable to a suction apparatus and a cutting member that is slidable across the mouth of the cup. As the cutting member may take the form of a flexible loop of wire, a rigid ring, or a knife, with or without a crushing blade, this principle is applicable to most of the fenestrated instuments now on the market. The word "Vacutome" is suggested as a generic term for instruments of this type.

In the first instrument (Fig. 1), the cup projects beyond the cannula of the snare. Its rim is elevated and beveled toward the center, while a loop of wire surrounds the base. The ends of this wire are carried through the cannula and attached to the slidable part of the snare in the usual manner. In operation, the cup is clapped over the tonsil and fifteen to twenty pounds of negative pressure applied. As the rim of the cup is elevated, no air can leak in through

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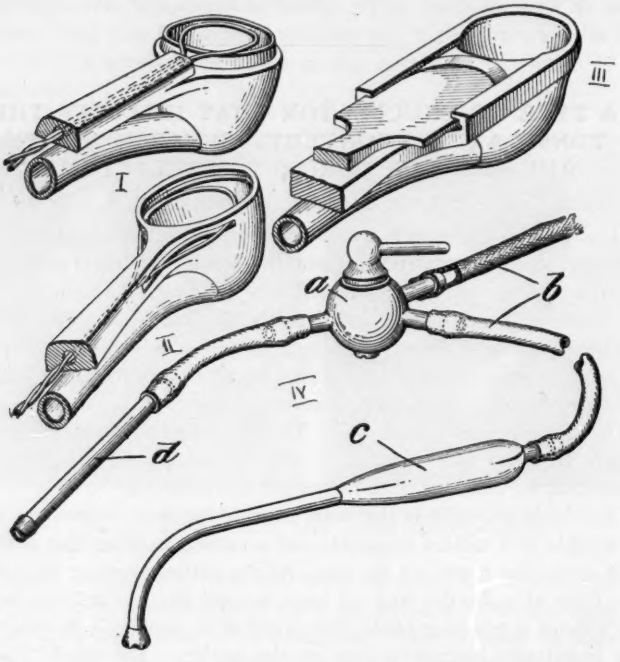
the cannula of the snare, hence the tonsil is sucked into the cup. It is then severed from its attachments by tightening the snare, the beveled edge allowing the loop to glide up and across the mouth of the cup. Meanwhile serum, blood, pus and caseous plugs from the tonsil itself are sucked into a wash bottle instead of being extruded into the mouth and pharynx.

This instrument will remove the tonsil en capsule and, if sufficient care is not exercised, a portion of one or both pillars as well. This accident can be avoided with comparative ease, for by discontinuing



suction just before the snare is drawn home, any pillar that may have been caught in the cup can be released instantly. Though ideal in some respects, it is doubtful if negative pressure will ever prove to be as safe as digital manipulation. At all events, I do not feel justified at the present writing in turning this instrument loose on any unsuspecting public and am presenting the same merely as a matter of record.

With the Beck model (Fig. 2) no such objection arises since no change in the Beck technique is necessary or desirable till

after the tonsil has been forced through the ring—which here constitutes the rim of the cup—and the snare has been drawn taut and locked. If suction is then applied, no contiguous tissues can possibly be draw in, while at the same time all septic material from the tonsil is deposited in a wash bottle instead of the mouth or pharynx. Moreover, the tonsil itself is held more securely than by any form of tenaculum. Though desirable, suction is not an absolute necessity, providing the cup be kept rim side up.

There is always more or less difficulty in reforming and replacing the loop of the Beck snare, once it has been drawn into the cannula. This difficulty has been obviated by slotting the bottom of the ring and the sides of the cannula. The slot is actually carried farther down the cannula than appears in the illustration.

A working model of this instrument was submitted to Dr. Beck, who saw sufficient merit in the idea to allow me to present his instrument.

The Sluder model shown in Fig. 3, has all of the advantages above enumerated, while the application of negative pressure is not so necessary as in the Beck model. Since the blade of the knife completely closes the mouth of the cup, the suction tube might be eliminated entirely. It seems desirable, however, in order to prevent the fluid contents of the tonsil from escaping in to the pharynx. In using this instrument, there should be no change in the Sluder technique till after the tonsil has been tightly engaged by the knife. If the operator so desires, suction can then be applied while the tonsil is being severed from its attachments. After seeing two rather crude experimental models, Dr. Sluder has kindly permitted me to present his instrument.

So far as the vacuum cup is concerned, the Sauer model is to all intents and purposes, the same as the Sluder, (Fig. 3). Dr. Sauer has kindly allowed me to include his instrument in this list, after having seen a working model of the same.

It is self-evident that the vacuum principle is equally applicable to instruments having a crushing blade. To be of any use, on what is probably the most popular of these instruments, certain changes in design are necessary; for, as at present constructed, there is a gap at the proximal end of the fenestrum when the blades are driven home.

In the case of one of the newer "hemostatic" instruments, there is no apparent reason why the vacuum cup should not prove satisfactory. This instrument was tried out with the idea of

applying a vacuum cup but this was not done as its hemostatic properties were, in my hands, inferior to those of the new Sluder.

I have experimented with another instrument which is ot a different design from any of the above. So far as I could determine the vacuum cup was entirely successful. I notified the inventor of the instrument and at his request sent him the experimental model, as he saw no particular advantage in the vacuum cup as applied to his instrument, I do not feel at liberty to describe the same.

As I prefer to operate without an assistant, it was necessary to devise some means for controlling the suction apparatus. The three-way cock (Fig. 4a) meets this need admirably. With this device negative pressure can be applied or discontinued instantly by simply turning the valve, while both the tonsil instrument and an ordinary suction tube are available without the necessity of disconnecting the one or the other. To have the two tubes (Fig. 4b) of a different color is an added convenience in this regard. When in use, the cock can be anchored to the operator's gown or any other convenient place by two safety pins applied above and below the Y respectively. As regards suction tubes, I prefer the modified Yankauer (Fig. 4c). The metal tube (Fig. 4d) for connecting on to the unsterile hose line is more satisfactory than any form of glass connection. Flushing out the hose line with cold water will keep it from being clogged with blood clot.

Summary: In the first model described, the attempt is made to use negative pressure in place of digital manipulation, it is doubtful, however, if an instrument ever can be devised that will enable a tonsil to be sucked into a cup and then severed from its attachments with perfect safety to contiguous tissues. So far as the vacuum cup is concerned, the other models are entirely free from this objection, since no suction is, or ever should be applied till after tonsil has been completely engaged by the cutting member.

Enough experimental models have been constructed to demonstrate that the vacuum principle is applicable both to the guillotine and the ringed snare, while actual trial has shown that the cup itself in nowise alters the general characteristics of the original instrument. It is therefore purely a matter of choice as to which model is preferable for routine use. With any one of these models it is possible to remove tonsils with the assurance that their septic contents will be aspirated into a wash bottle and not into the lungs.

In conclusion I wish to express my appreciation to Drs. Beck, Sluder and Sauer for their hearty co-operation in this experimental work.

A MODIFICATION OF AN OLD BUT SAFE INSTRUMENT FOR THE COMPLETE ENUCLEATION OF THE TONSIL.

Dr. A. J. Shekter, Jamaica, N. Y.

The operation for enuculation of the tonsil has for its object the complete removal of the gland without injury to adjacent structures.

At the present time two methods for enuculation most frequently employed are, the guillotine operation with the instrument modified by Sluder and with additional modifications by others and the snare operation with which the tonsil is severed from its attachment by means of a cold wire after dissection from its bed in the fossa.

I am not going to enumerate the advantages of the Sluder method, these are limited and the instrument is without danger only in the hands of a skilled operator. The disadvantages are however, the considerable primary and occasional secondary hemorrhage, the great liability of trauma to the pillars, soft palate and uvula, button-holing or removing part of the pillars, laceration of the mucous membranes and removal of part or injury to the intra-pharyngeal aponeurosis all not infrequent.

The dissection and snare method is ideal but also becomes dangerous at times. It requires considerable experience to develop a good technique which even when mastered does not prevent the operation from being at times a long and tedious one, because of the difficulty in dissecting the tonsil out of its bed; when this does occur the patient is subjected to increased trauma, shock and prolonged anesthesia. The adjacent structures become traumatized by the instruments employed to free the tonsil from its attachments where sharp dissection is employed, and to a lesser degree with dull dissection; the aponeurotic lining of the tonsilar fossa, which is part of the intra pharyngeal aponeurosis is almost always injured or removed, exposing the underlying structures, thereby increasing the chances of hemorrhage and infection.

I have had ample opportunity to study these difficulties in the teaching clinic of a large New York hospital where a series of about fifteen hundred tonsilectomies performed came under my care. Most every method for tonsil enuculation was used and the conclusion drawn was that after all, the old Beck Schenk or Beck Muller is the safest instrument even in the hands of the beginner. The only objection to these old instruments however, being that they

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cannot be so easily manipulated with the left hand as well as the right, especially so with operators having short fingers and also that there is quite a strain put upon the wrist where an adherent tonsil has to be forced into the fenestra of the instrument. However, these difficulties have been overcome by modifying the instrument in such a way that it can be handled very easily and simply

Fig. 1. Beck-Shekter Tonsillectome.

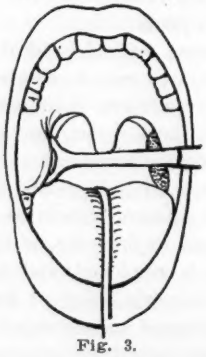

Fig. 3.

with either left or right hand allowing easy manipulation with no wrist strain.

The instrument as you see it is modeled in general after the Beck Schenk snare; unlike the Beck Schenk snare it has the advantages of a Sluder handle and trigger arrangement for pulling up on the wire loop. The instrument has a direct pull, is easy of manipulation, well balanced and can be taken apart quickly for cleaning and sterilization. The handle is removable and adjustable. Unlike the Sluder or the Sluder snare combinations, it is a safe instrument

even in the hands of a beginner, for to use a combination of a Sluder and snare instrument and say it is safe or the safest instrument is a fallacy. If one uses such a combination, he Sluders the tonsil first, which means he must be careful not to injure the pillars or uvula or adjacent structures, and after the blade is forced down over the tonsil it is only then that the snare comes into play, and instead of cutting off the pedicle with a sharp instrument or blade, the operator snares it off, he is not eliminating the dangers of the

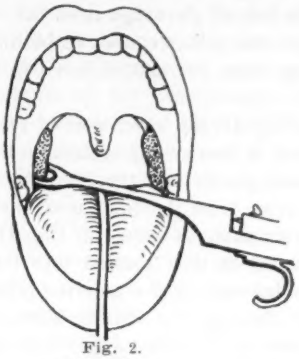

Fig. 2.

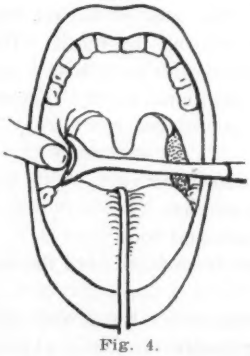

Fig. 4.

Sluder any more than an instrument having a dull and sharp blade does. The sharp blade cuts only what the dull blade crushed. If the pillar happens to be crushed the sharp blade cuts that too. If the uvula happens to be pushed into the fenestra the blade cuts that also—so whether you cut or snare off tissues outside the crushing blade, is only a matter of choice, but not a danger guard. To use any unnecessary force in enuculating a tonsil by pressing the instrument into the fossa is dangerous. I had occasion to see injury to a

styloid process of the mastoid, which bulged the solf structures into the tonsil fossa by such a forceful manipulation. This modified. Beck is safe because it has all the advantages of the Beck Schenk with the added features of a removable Sluder handle, making it easier for manipulation. There is absolutely no danger to soft parts from a crushing blade or danger from using sharp dissection. The tonsil is everted from its bed without injury to the aponeurotic layer covering the fossa thus avoiding unnecessary scarring. The wire passes along the line of cleverage from behind, forward—the uvula cannot be caught, the pillars cannot be buttonholed.

The following steps for enuculation of the tonsil give the best results.

As shown in Fig. II, the lower pole of the tonsil is engaged first.

The instrument is then swung around so that the body and upper pole of the tonsil passes into the fenestra, the instrument is now pulled slightly away from the fossa until the tonsil is seen to bulge under the anterior pillar as shown in Fig. III.

The entire tonsil is then pressed into the fenestra with index finger, also pushing with it the anterior pillar until the rim of the fenestra is felt through the muscle fibres of the anterior pillar. With the pressure of the index finger still maintained on the pillar and tonsil, the lock is then released and the trigger pulled up as far as it will go without snaring the tonsil. The instrument is then locked, the tonsil clamped with an ordinary tonsil clamp and slowly snared off by turning the thumb screw. The tonsil is found everted from its bed in little or no bleeding.

SUMMARY.

The main points to remember are:

1. Engage lower pole first.
2. Engage upper pole and body.
3. Pull out fenestra from fossa until the tonsil bulges under anterior pillar.
4. Milk into fenestra entire tonsil and pillar.
5. Do not relax pressure on tonsil while pulling up on snare wire.
6. Clamp tonsil and snare off pedicle by slowly turning thumb screw.

If the entire tonsil has not been caught in snare, a mass will be felt under the anterior pillar after the wire is made taut by pulling on trigger.

150 150-01 88th Avenue.

THE REMOVAL OF THE FAUCIAL TONSILS.*

DR. HENRY JONES MULFORD, Buffalo, N. Y.

There are still persons who say that the removal of tonsils is just a fad, that the operation is performed willy-nilly. But we who see so many tonsils know that the very seriousness of the situation forever bars the operation from that class. The tonsil operation today rests upon a logical foundation: the foundation of necessity. There are still others who smile at the mention of tonsils, and who assert that there is nothing more to be said upon that subject. But the last word on tonsils has not been uttered; the subject still is perennial. The writer adds another word or two to the discussion for the purpose of emphasizing the value of fine workmanship in this region, and to call attention to certain instruments suited to the hand of the fine workman.

Analyzing our subject, "The Removal of the Faucial Tonsils", we find that it contains two questions to be answered: "When shall the tonsils be removed?" and, "How shall the tonsils be removed?" Let us answer the first question first.

When Shall the Tonsils be Removed? When the writer began the practice of medicine the tonsil was just a tonsil, just a piece of tissue unimportant until it bulged into the pharynx, or became "sore". If it was sore it was touched up with silver nitrate, tincture of iron, or potassium chlorate; if it was a large tonsil it was guillotined. But today we know that there is vastly more to the situation than a mere local condition. Increasing knowledge, especially that embraced under the term "focal infection", has revealed the evils following in the train of the tonsil. We have discovered that the size of a tonsil is no measure of its menace, and that a tonsil does not have to be inflamed to be dangerous.

Study of the tonsil is giving to us a better understanding of its life history, and is uncovering many facts as to its relationship to disease in remote organs. It is becoming apparent that the faucial tonsil has what may be designated a life "cycle", a cycle not synchronous with the life of the individual. That is, while the tonsil is born with the individual, it "dies" long before he does. In active function during the childhood and youth of its possessor, it loses its activity at the approach of maturity, or soon thereafter. Its fibrous elements, gradually increasing, crowd out, or retard the function of, the lymphoid cells.

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*Read before Buffalo Medical and Surgical League, December 13, 1923.
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The tonsil, then, should be approached by the operator with conservatism, the age of the patient and the condition of the tonsil, to be the determining factors as to the advisability of its removal. A tonsil in a child is not to be removed merely because it is large. It must be determined whether that tonsil is swollen through a physiologic hyperplasia of its lymphoid cells, or is large because of a true hypertrophy of its elements. Especially the fibrous. If a tonsil *swells* because of an excess of function it will subside when the excess demand ceases. It, therefore, would be a crime to remove that tonsil, for, noting its activity during childhood we suspect that, the performance of its function is needed in the developmental progress of the child. But, coming now to the later period in the tonsil's life "cycle", we are confronted by a different situation. We have now a tonsil that no longer properly may be designated a tonsil; it is mostly just a useless collection of connective tissue fibres. *It is a tonsil in senescence.* It is worse than useless; it has become a direct menace. While its structure has altered, its form still is that of the tonsil; it still has its crypts, that often have become pockets; and it still is in contact with the circulating fluids of the body. Add to this the fact that it probably has become smaller and has been more closely encompassed by its surrounding tissues, thereby shutting off the normal self-drainage of the crypts, and the menace of the situation at once becomes apparent, that of the possibility of infection without warning. The senescent tonsil becomes a hot-bed for the propogation of pathogenic bacteria, without local reaction, the bacteria, passing directly into the lymph channels, are carried to remote tissues, there to light up as actual disease. We find this illustrated in tuberculosis, in arthritis, in so-called rheumatism, in appendicitis. The "flora" of the senescent tonsil is considerable, but the micro-organism found there most constantly is the streptococcus. In fact, the streptococcus is found everywhere; it is ubiquitous; it is the great common enemy of mankind. Certain of the micro-organisms might be termed aristocratic, they are so very selective in their choice of a field for their activities, but the streptococcus does not seem to care where it goes. We see, then, that there may be an infectious tonsil without the tonsil itself reacting to the infection which it transmits.

There is no longer any doubt as to the role of the tonsil in the transmission of pathogenic bacteria. Experiment proves it; clinical evidence proves it. We know that the micro-organisms enter the tissue cells, for we find them grouped within these cells. Why, then, may they not pass through the cells? They are even small enough to pass between the cells. We know that they pass through the

tissues in acute infections of the tonsil, for we find them in the blood stream almost at once, even though all the forces at the command of the organism rally against them. How much easier, then, will it be for these organisms to pass where there is no resistance.

We come now to the answer to the question "When Shall the Tonsils be Removed?" and the answer is, of course, when they are a menace. The menace lies in two directions: When the tonsil becomes an obstruction through hypertrophy of its substance, and when it becomes an agent for the transmission of infection. The second is the more important of the two for it is the more common and the more apt to be overlooked. Having determined that an operation is necessary we now have to answer our second question.

How Shall the Tonsil be Removed? The operation for the removal of the faucial tonsils is the most abused of all the operations; so many men, incompetent, thinking themselves competent, are attempting it. Considering it a minor operation the novice and the general practitioner go at it with equal nonchalance. But they forget that this operation is now a major one. It is an operation of fine technique and for fine instruments. No longer may it properly be performed with a guillotine or a pair of scissors. These instruments, even though they are used by certain prominent operators, are archaic, so far as the tonsils are concerned. The operation belongs with the specialist, of course, with him who has been trained to perform it, and who does it constantly. There are many methods for the removal of the tonsils; but, in the opinion of the writer, there is only one that may be depended upon to answer the demands of all cases. There is no operation yet devised that equals the dissection operation in its adaptability, in its cleanness of result, and in its safety of performance. It is the operation *plus ultra* for the fine workman. But, even this operation may be ruined through the use of poor instruments; and it is surprising how many poor instruments there are in use. So many are large, awkward, unwieldy; so much metal is put into them that they resemble carpenter tools rather than surgical intsruments. As the operation is reviewed in this paper the writer will show, by means of illustrations, what he considers to be the best instruments for the removal of tonsils. One is a knife designed by, and another is a tongue depressor modified by, him, while the others have been used for some time.

In addition to technique and instruments there are three points of importance in the tonsil operation. First, the anesthetic; second, the field of operation; third, the tonsillar fossae.

The Anesthetic: In selecting an anesthetic the first choice lies between a local and a general, the second, between the various substances available.

The writer prefers the general anesthetic in all cases, except, of course, in those cases where there are contra-indications. The general anesthetic is safer, and under it the patient is under better control; the operator is undisturbed by the patient himself, and is better able to cope with hemorrhage. It certainly is the choice where children are concerned.

Of the substance used for general anesthesia nitrous oxide, or nitrous oxide and ether are the ones most commonly used in private practice today. Straight ether comes next, with chloroform at the end of the list and quite taboo. The administration of nitrous oxid is now upon a scientific basis; and the use of it, and its combination with ether, is almost completely safe. It is this consideration of safety that should govern in the selection of an anesthetic.

There are many drugs that may be used locally in tonsil work, but care should be used in the selection of any substance that is to be thrown into the circulation. In the writer's hands stovain and novocain have been the most satisfactory, used hypodermatically and uncombined with adrenalin (epinephrin). There have been too many unexplained accidents associated with the tonsil operation where adrenalin has been combined with the local anesthetic for hypodermatic use. The writer applies the epinephrin solution to the tissues after anesthesia has been established, and as the operation progresses. The hypodermatic use of cocain is no longer considered reasonable in this region.

The Field of Operation: It is imperative that the field of operation is open to the eye of the operator at all times. It is imperative for two reasons. First, so that no blind thrust of an instrument may injure the surrounding tissues. Second, so that no bleeding may continue unnoticed after the tonsils are out. The mouth should be kept wide open, the tongue well down. For the mouth, any gag will do that is not too cumbersome; for the tongue any depressor that will control the tongue. All depressors will not do this. There are many fool ideas metallized as tongue depressors. The tongue depressor should be so shaped as to control the tongue, and get it out of the way. The writer uses one of his own, a modification of the Wolff. (Fig. I). In this the tongue blade is lengthened and its extremity dropped well down so that, with it, one may reach in toward the base of the tongue and draw the mass of the tongue well forward.

The next step is that of drawing the tonsil forward from its bed in its fossa by means of a tenaculum. The tenaculum usually used is one that opens and closes as does a forceps. This form is cumbersome and needs to be used with care else the pillars will be engaged by the teeth of the instrument. Then, too, the snare loop is not easily adjusted over its handles. The writer would call attention to a later style of tenaculum, and one greatly superior in its adaptability to the other variety. This is the "Corkscrew" tenaculum and is shown in figure 2. This is screwed into the substance of the tonsil, can do no injury, and the wire loop slips over it without difficulty. In case the tonsil is large two of the tenacula may be used.

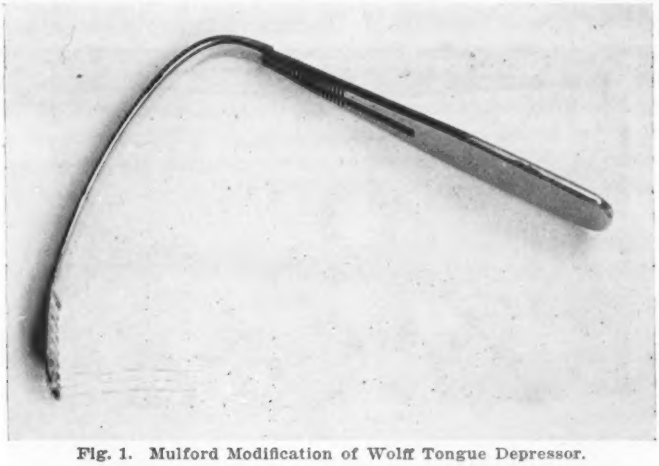


Fig. 1. Mulford Modification of Wolff Tongue Depressor.

Fig. 2.

Fig. 3.

We come now to the division of the plica which has been put upon the stretch by the drawing forward of the tonsil. There are various instruments used for this purpose, from knives to blunt dissectors and scissors; but the writer uses a special knife*, made by Codman and Shurtleff, of Boston, and shown in Fig. 3, which he has devised, and which he prefers to any other instrument. This knife has a rather long curved point. The advantage of this knife over any

*Presented at the December meeting of the Buffalo Oto-Laryngological Society.

other is that the point, once through the plica, may be followed by the eye as it is pushed forward under the plica, and so guided away from the pillars; the downward curve of the point also is a help in this direction. In severing the plica the usual course is to insert the point of the knife through the plica at the apex of the tonsil, pushing it inward and downward in the direction of the posterior pillar, keeping close to the pillar. That incision completed, the knife point is reinserted at the apex, but directed outward and downward to follow the anterior pillar, carrying the incision downward as far as the tonsil extends. Below the lower end of the anterior pillar, and between the base of the tongue and the tonsil, there are, usually, irregular masses of lymphoid nodules attached to the plica. The incision of the plica must be carried down so

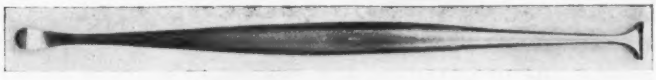


Fig. 4. Hurd's Dissector.

Fig. 5. Hooper Snare.

that these masses are included with the severed plica, else there will be a filling in of the tonsillar fossa from below by a hyperplasia of the cells of these tissues, simulating a new tonsil. After this complete severance of the plica, Hurd's dissecter (shown in Fig. 4) is introduced behind the tonsil, while gentle traction is made with the tenaculum, and the tonsil is coaxed from its fossa. When the tonsil has been so detached that it may be pulled almost out of its fossa the snare is adjusted around its base, drawn well down *to include all tissues below,* and the severance of the tonsil completed by the gradual tightening of the snare.

The writer wishes to say a word in regard to the snare used by him. It is the Hooper nasal snare as made by Coleman and Shurtleff. (See Fig. 5.) While this is a nasal snare, anyone using it will find it just as well adapted for use in the pharynx. Its shape is right, it is light in construction, yet strong enough to meet any tonsil requirement, and the worm screw in its handle permits of the gradual tightening of the wire loop. Its lightness of construction is a distinct advance, though it was in use long before they were thought of, over the cumbersome tonsil appliances of today.

The Tonsillar Fossae: After the tonsils have been removed by this method the fossae are dry, unless an unusual blood vessel has been encountered or the patient is a "bleeder". In any case any unusual bleeding is easily checked. If the vessel is small pinching up with a forceps for five minutes will suffice; if it is a general oozing any one of the recent blood coagulating solutions will check it. In extreme cases suturing the pillars is an absolute check. It is the operator's duty to see that all bleeding has ceased before the patient has left the table. With the means at hand for the control of tonsillar hemorrhage it must be a very unusual accident of this sort that ends fatally.

Another point in regard to this operation is that *the tonsillar fossae are swept clear of all tonsil tissue,* and, once clear, this tissue is not apt to recur. This is not to say, however, that the fossae may not fill in with some lymphoid or fibrous tissue, although such filling in is unusual. Nevertheless, it does occur upon occasion. The tissues in this location are homeoplastic. They renew themselves upon the slightest excuse. This is especially so in regard to lymphoid tissue; it seems to have an especial tendency to run wild; and at times surgical interference seems to excite this tendency into action. But this homeoplastic tendency on the part of the tissues must not be made an excuse for poor surgery. If a poor operator, or an operator using a faulty method, leaves some tonsil within the fossae, it cannot be said that the stump of tissue so left proceeded through any homeoplastic action.

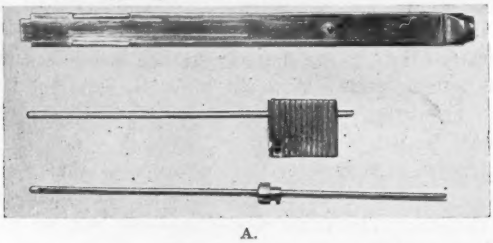
In conclusion let me reassert the superiority of this operation for the removal of the faucial tonsils as performed with the instruments described. It is the best operation yet devised; it is the least subject to accident; it leaves the fossae cleaner, with less liability to a recurrence of tonsil tissue. It is the one tonsil operation requiring skill and care in its performance, it is the one operation adaptable to the hand of the fine workman.

949 Delaware Avenue.

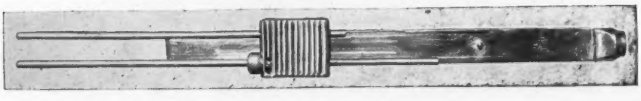
A GUARDED SEPTUM CHISEL.

Dr. Simon L. Ruskin, New York City.

The instrument presented is one of a set introduced at Dr. Imperatori's clinic at the New York Post Graduate Medical School and Hospital to facilitate operative work by the student. It was found that in doing a submucous resection of the septum the students would avoid working on the vomer whenever chiseling was necessary, thus frequently leaving the obstructing ridge. To overcome this difficulty, I have devised a chisel that can be used with safety and also make unnecessary the aid of an assistant for tapping the chisel.



A.



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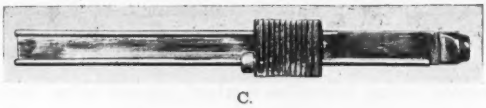

C.

Occasionally, in doing a submucous resection one finds in working posteriorly that the ridge keeps widening till in many instances it becomes impacted against the inferior turbinate. In these cases there is no room for a grasping instrument and working with the usual chisel causes the laceration of the mucous membrane. It is this particular difficulty that is most easily overcome by the guarded septum chisel.

A glance at the illustrations will readily reveal the principle on which the chisel operates. The instrument is introduced as-

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sembled as in illustration B. The bone to be removed is placed between the rails thus at the same time separating the two membranous flaps. When the chisel has traveled the length of the rails and has cut through the bone in its path it is automatically stopped by a peg in the blade so that the cutting edge does not go farther than originally intended and can at no time cause a laceration.

In the case of an impacting ridge the rails can be separated and inserted underneath the crista. The parts are then assembled and the blade forced through the bone. The rails also act as a speculum so that the handle of the instrument can be held in the left hand and the right be free for tapping the blade.

The chisel is made in two sizes.

351 West 86th Street.

Editor of THE LARYNGOSCOPE, March 25, 1924.

In the last number of THE LARYNGOSCOPE, February, 1924, there appeared an article under the title—"Otologic Observations. (A) Oculo-Vestibular Past-Pointing Reflex. (B) Bone Conduction of C64 and Lower Tones", by Dr. Emanuel M. Josephson.

In this article the author makes the following statement:

"In a very high percentage of normal individuals whose vestibular apparatus functions normally, it has been observed by the writer, that if without previous irritation of the vestibule, past-pointing be tested for, with the eyes of the subject rotated it will be found present."

It may be of interest to the readers of THE LARYNGOSCOPE as well as the author to learn, that a similar observation has been made and previously reported as early as 1913 by B. Fischer (Wiener Klin. Wochenschrift, 1914), and by Kiss (Z. f. d. ges. Neurol., 1921).

Comments to the same subject are found in an article of R. Barany (Acta Oto-Laryngologica, 1922), as well as in the well known booklet, "Functionspruefung des Ohres", by A. Sonntag and H. J. Wolff, second edition, 1920, page 67. Very truly yours,

DR. JOHN GUTTMAN.

987 Madison Ave., New York, N. Y.

THE USE OF THE GALVANO-CAUTERY IN THE TREATMENT OF TUBERCULOSIS OF THE LARYNX.* **

DR. GEORGE FETTEROLF, Philadelphia.

There is no protracted pathological condition which we, as oto-laryngologists, meet with any degree of frequency that presents a more heart-rending picture than does a well developed case of laryngeal tuberculosis. These unfortunates suffer so miserably and so little relief is afforded them, that the vast majority drag out a harrowed existence, dying wretchedly from a combination of toxemia, starvation and pain.

The object of this paper will be to present in very brief form what I have learned about the use of the galvano-cautery as a curative agent in laryngeal tuberculosis. Other forms of local treatment, such as medication, sunlight, etc., will not be touched upon. Nor is there time to dwell upon diet and hygiene, including "vocal rest", so essential in the treatment of the patient. I simply will try to present as briefly as possible the theory and practice of the one single therapeutic maneuver, discussing it from two standpoints, the experimental and the clinical. I am under obligations to Dr. Paul A. Lewis, of the Henry Phipps Institute of the University of Pennsylvania, for valuable advice and indispensable material in the experimental work, he generously placing the facilities of his laboratory at my disposal. Dr. Herbert Fox, director of the Pepper Clinical Laboratory of the University Hospital studied the slides with me and interpreted them for me. Without the direction and help of these men the experimental work could not have been done.

Some years ago it was my privilege to enjoy a seven year service of 250 tuberculosis beds. Of these patients 80 per cent were in the incipient stage of the disease, while the other 20 per cent were late cases. A portion of this service included the flourishing Out-Patient Department and the splendid Department of Pathology of the Henry Phipps Institute for the Study, Prevention and Treatment of Tuberculosis. These combined facilities offered opportunities for a well-rounded study of the disease, and some of the lessons learned are embodied in the present paper.

Frequency: In order to ascertain the frequency with which terminal lung cases were complicated by invasion of the larynx, I studied

*Read, by invitation, at the annual meeting of the New England Otological and Laryngological Society, held at Boston, January 24, 1922.
**From the William Pepper Laboratory of Clinical Medicine.
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a series of 100 larynges which had been removed post-mortem at the Phipps Institute. The results were published[1] in 1914 and suffice it here to state that of this 100 the larynx was tuberculous in 83, doubtful in 4 and non-tuberculous in 13. These figures represent the study of only the gross appearances. Had each specimen been submitted to the microscope probably the percentage would have been increased. It is thus fair to state that 80 per cent to 90 per cent of lethal cases of pulmonary tuberculosis have involvement of the larynx in some degree, and when these figures are translated into terms of suffering, the sum total is an awe-inspiring one.

Painfulness of the condition and futility of treatment: It was very stirring to note the racking distress induced by this disease, and by the vicious circle which was formed by pain, dysphagia, insufficient food-intake, consequent lowered resistance, increase of the tuberculous disease, pain, etc. Very impressive, also, were the very trivial results of treatment of the larynx. The treatment used consisted of introducing sundry drugs into the larynx, touching the ulcers with various solutions and removing by means of cutting forceps bits of diseased tissue. The results were neglible as to cure and trifling as to result.

For a time I used punch-forceps of various forms in removing the epiglottis, as well as tuberculomata and infiltrations involving various portions of the larynx, but three cases occurring close together soon put a stop to the routine use of such instruments. These three cases all suffered from extensively infiltrated epiglottides with the rest of the larynx negligibly involved, and in all three the procedure was the same, viz., a removal of the epiglottis in two large lateral and one median bite. To my distress this operation was soon, almost immediately, followed by a fulminating infiltration of the aryteno-epiglottic folds, which extended rapidly and widely, and all three patients succumbed to a painful death. I believe that by instrumental squeezing I had driven the infection into the new areas of involvement. The net result of all forms of treatment was terribly discouraging, and the temptation was to subscribe to the then popular and even now too-widespread belief that "throat consumption" is practically invariably fatal. Following the pioneer work of Grunwald[2] and the later experimental and clinical work of Wood[3], I began using the galvano-cautery. I rather dreaded adopting the procedure, fearing extensive reactions in the way of pain, edema, slough, etc., but these fears soon disappeared and I became excitedly elated over the arrest and apparent cure of many cases which previous experience had labeled as being beyond help.

Pathology of the tubercle: Now for two general considerations. First, as to what a tubercle is and second, as to Nature's method of curing it.

A tubercle may be defined as an inflammatory and necrotic process due to the presence of the tubercle bacilli. "In general, it may be said that tubercle bacilli may stimulate the connective tissue cells in their vicinity to proliferation; or they may excite emigration of leucocytes from blood vessels and lead to the production of other exudates; or they may cause death of tissue. Thus the phase of inflammation which are excited by the tubercle bacillus are productive, exudative and necrotic[4]."

It will be noted that two of these processes are beneficent, the productive and the exudative, and they compose an army which is gathered for the purpose of attacking the invader.

Other characteristics attending the invasion of the tubercle bacillus are these:

Proliferation of the endothelial cells.

The formation of a new reticulum or stroma hand in hand with the growth of these new cells, or persistence of the old stroma.

A quite important fact is that "blood vessels are, not apt to develop under the influence of the tubercle bacillus. Old blood vessels are, on the other hand, usually obliterated as the new tissue forms."[5]

"Finally, dense fibrous tissue may form in and about foci of tuberculous inflammation, encapsulating or sometimes entirely replacing the more characteristic new formed structures. It is in this way—by the formation of connective tissue—that such repair as is possible after local tuberculous inflammation is brought about."[6]

When a tuberculous lesion is progressing it is evident that Nature's processes of resistance are so ineffectual, so slow or so long delayed that artificial means of inducing them must be resorted to. Hence, our endeavor in applying local therapeusis should be to promote those processes which are Nature's own. These comprise round cell infiltration, multiplication of fibroblasts, fibrosis and vascularization.

Experimental work. In the endeavor to study systematically and progressively the effect of the cautery on tuberculous lesions, the following experimental work was done on guinea pigs. Each of these pigs had a tuberculous ulcer in the abdominal wall at the time the cautery was applied. These were treated in various ways. In two the entire ulcer was seared. In three, the ulcer was bisected to the base with the cautery. In two, four penetrating gal-

vano-punctures were made into the ulcer itself. In eight, three closely adjacent punctures were made into the infiltrated margin of the ulcer, and of these one specimen was taken every second day, so that by studying the series the progress of the local process could be noted. In one specimen the tuberculous nodule had not ulcerated and a single puncture was made into its center. The specimens were removed, hardened and prepared for study in the usual manner.

The following is a condensed summary, given by Dr. Herbert Fox, of the results of these studies: "The characteristic change is a slough which remains in place for at least 10 days and is formed of a ribbed hyaline material which takes an eosin stain, except for fragments and strands of nuclear matter. Beneath it a fibrin coagulum forms, rich in polymorphonuclear cells and this separates the slough from the underlying tissue. The latter contains necrotic fibres, a coarser fibrin coagulum and scattered polynuclears. Round cell infiltration is irregular, but (in three sections) it is denser near the tuberculous granulation tissue adjacent to the puncture than in other tuberculous granulation tissue removed from the cautery puncture area. However, in the vicinity of the puncture area it can not be said that the number of fibroblasts is increased.

"In the vicinity of some of the puncture areas there is slightly more active epithelial growth than in the controls. This would aid in preventing ulceration and invasion by organisms tending to cause secondary infection."

Wood's[7] observations following his experimental work in 1911 are as follows:

"In three days after the cauterization of a low grade tuberculous lesion there developed a distinct zone of inflammatory reaction around the area of destruction. This reaction was manifest by the presence of newly formed blood vessels, congestion and fibroblasts. Beyond this zone of reaction the tuberculous process seemed unaltered. In six days the zone of reaction was much more marked, the blood vessels being more numerous and larger, and there was a distinct deposit of fibrous tissue between the epithelioid cells of the tuberculous mass. The tuberculous process beyond the zone of reaction was apparently unaltered except that it seemed for some reason less in extent. In twenty days the lesions were to the naked eye almost healed. A fibrous cicatrix had formed in the zone of inflammatory reaction, and though there was some tuberculous tissue still present beneath the scar the amount was very small and becoming gradually cicatrized.

"These few experiments seem to have sustained certain clinical observations in regard to the use of the cautery in treating localized

tuberculosis. There is no doubt that a retarding influence is exerted beyond the area actually destroyed by the heat. We know that a tuberculous nodule heals by cicatrization, and therefore anything that aids in the formation of fibrous tissue aids in the cure of the disease. Further, by the induction of acute inflammation with the subsequent formation of new blood vessels, nutrition is brought to a part which would otherwise break down into a necrotic mass because of a lack of sufficient food to nourish the tissues. Again the eschar produced by the burning prevents reinoculation until the tissue has become sufficiently resistant to protect itself. Also the cauterization seals the lymphatics and blood vessels, thereby preventing a spread of the disease either locally through the lymph system or generally through the blood vessels."

Now for the clinical application of these observations.

Classification: While the disease has been classified in various ways, it is possible that a good working classification of tuberculosis of the larynx is into *peripheral* and *central,* the former to include the epiglottis, the aryteno-epiglottic folds, the ventricular bands and the arytenoids, the latter the vocal cords and the tissues of the interarytenoid space. Overlappings and combinations of these groups are, of course, common. Broadly speaking the peripheral form is characterized by difficulty in swallowing and by pain, while in the central form alterations in voice are the characteristic feature. As regards swallowing it can be stated broadly that with the epiglottis alone involved greater dsyphagia is incurred with liquids than with solids, while with the arytenoids the main seat of the disease the ingestion of solids is the more troublesome. The peripheral cases are the more serious ones, and the ones most frequently requiring treatment, the central group usually not being threatening unless laryngeal stenosis supervenes.

Technique: The technique of galvano-puncturing is extremely simple, the only personal requisite being a very moderate amount of dexterity in intralaryngeal manipulation. Whether the work is done by direct or indirect laryngoscopy depends upon the preference and training of the individual operator, but the direct is as a rule more distressing to the patient. My own work has all been done by the indirect route.

Anesthesia: Local anesthesia is the one indicated, and the application of the anesthetic may be made by means either of applicator or of syringe, somewhat a matter of choice. When the patients reflexes are very active and when the point of attack is low in the larynx, the instillation of the anesthetic is probably the more satisfactory. When the upper portion of the epiglottis or the folds

attached thereto are to be cauterized the cotton tipped applicator carrying the cocain may be used to advantage. When the anesthetic is instilled the usual solution is 10 per cent cocain, 2 or 3 drops being dropped in every three minutes. The average quantity required to produce adequate anesthesia is about twenty drops, but the amount varies from fifteen to thirty. Occasional touching of the larynx with the cold cautery point is of value, not only in testing sensibility, but also in familiarizing the operator with the individual larynx and the patient with the instrument.

In using the cautery it should be at such a degree of incandescence that it enters the tissue with no resistance and comes away without sticking. For this purpose a white heat is desirable. The sensation transmitted to the operator's hand is about that of poking a large needle into a piece of dairy cheese.

The depth should include the full depth of the infiltration and the closeness should be such that the areas of reaction of adjacent punctures should overlap. About five to seven mm. distance between them has been the most effective in my hands, but this necessarily varies with the individual case.

After anesthesia is complete the method of treatment depends upon which form of lesion is being dealt with.

Types of lesion: From the theraupetic standpoint there are three general types of tuberculous lesion in the larynx, the ulcer, the tuberculoma and the infiltration. The ulcer may be deep or superficial, the former representing coalesced and broken-down tubercles which have broken into the throat and become the seat of a secondary infection. The latter represents simply epithelial necrosis.

The ulcer: In the deep ulcerative form the aim is to thoroughly abolish the entire lesion, destroying the tissue to a sufficient depth and width as to include all probably invaded tissue. This can be done either by surface searing or by making a series of deep punctures into the ulcer and its margins. Sucess has attended both methods; my own preference is for surface searing in the shallower and for puncturing in the deeper ulcers.

The superficial ulcer or erosion occurs rarely if ever except as overlying an infiltrated area, and therefor does not need to be attacked as an entity, but only as a part of the fundamental and underlying lesion.

The tuberculoma: Tuberculomas may be burned away and occasionally they are so situated as to require considerable nicety of manipulation. For instance they sometimes are found growing out from the ventricle, under which circumstances a right-angled cau-

tery point has to be introduced into this cavity. In one case treated some years ago the entire vocal cord of the left side was evidently one large cylindrical granulomatous mass, extending well beyond the middle of the glottis and above the lower edge of the ventricular band. I burned this away in successive layers, first reducing the cord to normal width and then gradually burning it down to the proper level. This patient had in his favor splendid general resistance and on examination several years after treatment, he was found to have almost a normal cord and but a slightly husky voice.

If the tuberculoma is pedunculated it is quite possible to pick it off with forceps, following this by cauterizing the base.

The infiltration: In attacking the infiltration type of lesion, the one by far most commonly seen, the aim should be to make punctures in such numbers and at such distances apart that the resulting cicatrical tissue will replace the tuberculous infiltration.

I especially like to find an edematous area, for such a lesion responds especially quickly to galvano-cauterization.

The number of punctures required depends upon the size of the lesions and the progress of the disease, and a large number of sessions may be required before all the diseased tissue is attacked and subdued. The greatest number of punctures I have made at any one time is eleven and the smallest, of course, is one. The one in whom I made eleven at a single session is a recent case of widespread disease, sent to me by Dr. Beattie Brown of Saranac Lake. His epiglottis was really huge and his aryteno-epiglottic folds were the size of a lead pencil. He was having such great pain and difficulty in swallowing that he was slowly starving. At our first session I made eleven punctures into his epiglottis, studding the upper part of this with needle holes about five mm apart. At his next visit he told me that his pain had been greatly relieved and that swallowing was quite easy. At the second visit I made a row of nine punctures into the left aryteno-epiglottic fold at equal distances from each other, extending from the epiglottis to the posterior commissure. At the third visit seven punctures were made into the right aryteno-epiglottic fold. All of these treatments were more extensive than usual, the average number of punctures being from two to five. This case did finely, ate well, had only slight discomfort, and gained weight, but then a dire disaster befell him. The tuberculous process invaded the lymphoid tissue of his pharynx, and in my experience, this process as a secondary one is invariably fatal. While the lesions of his pharynx are now being cauterized as fast as they appear, nevertheless he is rapidly going down hill.

Effectiveness of galvano-cauterization: The effectiveness of cauterization varies greatly in different individuals. Some cases grow steadily worse, others respond quickly and brilliantly. Again there are cases in which the same region has to be cauterized several times and a regular follow-up system has to be observed. One very successful case was under treatment for over a year, literally every part of his larynx being involved. More than 350 galvano-punctures were made into his larynx, and now with the exception of a cicatrized stump of an epiglottis he has a normal looking and perfectly functionating larynx. This was five years ago and today he is the active head of a large business.

Untoward events: The questions most frequently asked about this work are "what kind of reaction is there to the burning? Aren't you likely to cause edema of the larynx?" In an experience of literally thousands of these punctures in the larynx I have yet to see anything but a trifling reaction and I have never seen one case of even slight edema. This is amazing, but true.

Two types of untoward events have been noted, hemorrhage and stenosis of the larynx.

Hemorrhage: There have been three cases of hemorrhage, two following immediately on cauterization of the aryteno-epiglottic fold, and the third occurring about ten minutes after the searing of an ulcer of the posterior surface of the epiglottis. None of them caused any trouble. The third case is a recent one and has been at Saranac Lake for six weeks. Dr. Woods Price and Dr. Beattie Brown report that the epiglottis is healed and that the patient is unconscious of his larynx.

Stenosis of the larynx: Stenosis of the larynx has occurred twice, but whether *post hoc* or *propter hoc* it is impossible to say. On the basis that the latter is the explanation I have since tried always to avoid cauterizing two parts of the larynx, viz., the ventricular bands and the interarytenoid space. The reason is the same for both regions, i. e., the presence of adductor muscle tissue. Both of the stenotic cases supervened quite promptly upon punctures of the ventricular bands, both of them required tracheotomy, and both died. Following cauterization of the interarytenoid fold in one case, slight restriction of adduction followed, but there was no serious stenosis then or later.

However, it would seem to be good judgment to avoid causing cicatrix formation in any region where the result might be either adduction or restriction of the movement of the arytenoids. In the posterior commissure we have the arytenoideus muscle and laterally in the ventricular band we have the crico-arytenoidei and

the thyro-arytenoideus. The posterior crico-arytenoid is so placed that it could hardly be reached by a cautery point, but the other three are readily accessible. A safe rule would be whenever possible to avoid entirely the ventricular bands and the interarytenoid space, but if the disease in these locations has to be treated, to endeavor to cauterize only *to* the muscle tissue and not *into* it. Our patients are helped in this respect by the fact that muscle tissue seldom, if ever, is attacked by the tubercle bacillus.

The unexpected: In tuberculosis one soon learns to expect the unexpected and to be guarded in his hopes and prophecies. I remember very vividly asking Dr. E. L. Trudeau how he thought a certain patient would get along and his answer was: "A man who ventures a prognosis in a case of tuberculosis is a fool". Two recent cases of extensive laryngeal disease will illustrate this. One was a woman, sent by Dr. Hugh Campbell of Norwich, Conn., who was suffering severe pain and could swallow only a few drops of liquid at a time. She improved so amazingly after two rather extensive cautery sessions that she was able to eat large regular meals of all kinds of food. She returned home and seemed to be on the way to recovery, when she developed a pneumo-thorax and died in four days. Another patient, a man of 45, had a bad larynx so well cicatrized that he was able to resume his position as a judge of the federal courts. One day he complained of severe headache and in a short time was dead of tuberculous meningitis.

Summary and conclusion: The points favorable to the use of the galvano-cautery may be summarized as follows:

1. It can be used anywhere that electricity is installed or a portable battery can be carried. It needs no sunlight, no fresh air, no sanatorium.
2. It can be used either by direct or indirect laryngoscopy.
3. It promotes Nature's method of arresting tuberculous processes, producing almost at once vascularization and fibrosis.
4. It is applicable to all types of lesions.
5. It can penetrate at once to the full depth of the diseased area.
6. It is quick in action, and this is important, for even granting that such local measures as the application of formalin, lactic acid, iodin, etc., do cause tuberculous lesions to disappear, the improvement under cautery treatment comes in so short a time that many valuable weeks are saved, to say nothing of the prevention of possible spreading of the lesion.
7. It is characterized by absence of harmful reaction.

These are the points which have created the firm belief that the galvano-cautery is the only therapeutic agent which has proved to

be of real, consistent, wide-spread value in the surgical treatment of laryngeal tuberculosis, in that it affords relief and effects cures in all types of lesion and in so many otherwise incurable cases. A very noticeable thing is the slight attention which its possibilities have received, not only by oto-laryngologists in general, but also by those practising in the largest health resorts. In addition, the literature on the treatment of throat tuberculosis, with few exceptions, makes either casual, slight, or no mention of it. When a fuller realization of its potentialities become more widely known, it is not too much to hope that there will be no sanatorium for tuberculosis and no health resort which does not possess a specialist, with the interest, equipment and skill wherewith to do this work.

In such a disease as tuberculosis, the estimation of the value of any given form of treatment, of course, is a most difficult one. There are so many variables to be considered, as for example the virulence of the infection, the environment, the personal equation of the patient, his natural resistance, etc., that judgment is difficult. We see many cases of laryngeal tuberculosis recover under no more active local treatment than is applied to the lung condition, which is nothing at all, the entire cure being effected by building up the resistance of the patient to a point sufficient to enable him to combat the local invasion. We see others die, while being treated under the most favorable auspices. Long parallel series are needed upon which to base exact knowledge, series of a nature which are not yet available. In the meantime we can but labor, observe and report, in the hope that our work may benefit our patients, our observations be confirmed or disproved, and our reports stimulate others to like endeavor.

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2010 Spruce Street.

AN IMPROVED METHOD OF MAKING DIRECT LARYNGOSCOPY.

Dr. Wm. Moore Thompson, Chicago, Ill.

The method of direct laryngoscopy or autoscopy as the author prefers to call it, advanced first by Kirstein in 1894, aims at a direct peroral observation of the larynx, in contradistinction to the classical indirect method with the laryngeal mirror.

Direct access is obtained by straightening the normal angular configuration of the passage by the use of straight specula. By this means the upper jaw and larynx are displaced backwards and the root of the tongue and the epiglottis pressed forward.

The value of Kirstein's method is great even in view of the present developments of laryngological technique. However, we probably owe Killion the greatest debt for his elaboration and clinical application of the earlier methods developed. While its range of application and utility have lately been extended by the introduction of Bruning's method of counter pressive.

Kirstein's method represents for all future time a cardinal principle in the extension of surgical knowledge which should never be underestimated, since there can be no doubt that an organ which is directly approachable presents far greater possibilities of treatment than one which is only seen indirectly with the aid of a mirror, not to mention the clumsiness and inconvenience of its use, particularly in making topical applications or removing foreign bodies from the larynx in which case it is necessary for either the patient or an assistant to draw out the tongue. It is therefore no longer possible properly to pursue the modern science of laryngology without a complete mastery of the direct method of investigation.

A detailed description of the indications for the employment of the direct method is so closely bound up with the clinical aspect as to lie outside the scope of this treatise. I will, therefore, confine myself, for the benefit of those who are not yet acquainted with the method to a short review of the cases in which direct laryngoscopy presents the only likelihood of successful treatment, or in which it is obviously superior to indirect examination by the use of the mirror.

The first group of cases for which the indirect procedure must be considered inadequate comprises the following:

1. Patients not amenable to the mirror: These include especially refractory and troublesome children, who must if necessary be examined by force, or after the administration of a general anesthetic. in operations for papilloma and the like. In the case of adults it

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should be remembered that direct examination occasionally succeeds when a gag would have to be used to render examination with the mirror possible.

2. Foreign bodies which have become lodged in the larynx or are difficult to reach, especially when there is no certainty of the patient keeping quiet. The superiority of endoscopic extraction consists not only in the secure hold afforded but also in the fact that rotations about the longitudinal axis can only be performed with straight instruments without which the operation frequently does not succeed.

3. Cases in which, owing to pathological deformities, swellings or new formations the mirror affords but an unsatisfactory view. To these belong with gradual transitions, the majority of those laryngeal conditions in which the direct method affords a valuable supplement to the mirrored image.

4. The precise topographical deliniation of malignant tumors. Tuberculosis processes, etc., which should in all cases precede any attempt at operation. It is well known that in diagnosis made with the mirror there is often much uncertainty, so that even an experienced practitioner is liable to meet with surprises or disappointments when dealing with the larynx opened up for operation after an examination by the indirect method only.

5. The direct method of autoscopy as opposed to the mirror, affords complete surface inspection, such as is not otherwise obtainable. Moreover, direct illumination is so brilliant, that it reveals the most delicate alterations of the epithelium, which the mirror entirely fails to show.

6. In operation for polypi on the under surface of the vocal cords and in lesions in the region of the anterior commissure they are easily demonstrated and removed by the aid of the counter pressure autoscopy. If autoscopy is properly performed the little operations which require anesthetization of the larynx, can be performed with ease and confidence even by a more or less inexperienced operator at the first sitting.

7. Here could also be mentioned the fact that with the direct autoscopy, the trachea can also be examined thoroughly. Nor should the didactic value of the use of the direct method be overlooked as it is possible to demonstrate cases to great numbers of doctors or students once the instrument is in place.

The above is not given as a comprehensive outline of the possibilities of the use of the direct method of examination. The scope of this paper would not permit a complete one.

There are very few contraindications for autoscopy, but I will mention some of the most important:

1. At the top of this list should be mentioned dyspnoea, from any cause, in which, use of cocain is very dangerous.
2. Any disease in which any considerable increase in blood pressure is dangerous, such as aneurisms of the aorta.
3. Heart lesions where there is failure of compensation.
4. High degree of arteriosclerosis.
5. History of apoplexy.

There are also other features that should be considered in selecting the patient for autoscopy and these are physical characteristics. For instance, the patient with a thick, short, muscular neck will be found somewhat difficult, but the most trying physical characteristic is a thick tongue. Nearly all children and old people make good subjects. The best patient for the direct examination has a long, slender neck with abnormally thin tongue. With ordinary skill there is no danger connected with direct laryngoscopy, and if a judicious selection is made, results should be ideal.

ANESTHESIA.

It is true that direct laryngoscopy is practicable in most cases, even without anesthetization but this method presents various drawbacks. In such a case it is necessary to place the spatula between the tongue and the epiglottis, and not on its laryngeal surface which is very irritable and likely to provoke reflex contraction. The pressure is then exerted on the valleculae and the epiglottis is erected indirectly as in the use of the Reichert hook.

The disadvantage of this prelaryngeal method, which was earlier exclusively recommended by Kirstein is quite obvious. The field of vision is diminished in its lower part by at least the diameter of the epiglottis, even when this is fully erected, and in order to compensate this loss it is necessary very considerably to increase the pressure which is calculated to produce pain. The prelaryngeal autoscopy, therefore without anesthetic will be more trying to the patient than the endolaryngeal procedure.

The laryngeal applicator should be fitted with a swab of cotton fairly large but not too loose, and should be saturated with a mixture of 20 per cent cocain and adrenalin 1:1000 in the proportion of 10 to 1. Under guidance of the laryngeal mirror the moistened swab should be placed on the upper portion of the laryngeal surface of the epiglottis for one or two seconds, without touching the neighboring parts. Should the patient not cough spontaneously he should be asked to do so; it is also important that he spit out at once any cocain which may have gotten into his mouth.

All the surgeon has to do after this preliminary measure is to wait patiently for two minutes while the medicine takes effect. To

renew the application earlier only worries the patient without avail. The second application with a new swab will probably excite very little reflex and therefore may remain longer. After another pause the applications should continue until all reflexes cease and then a few strokes of friction will complete the anesthetization of this particular region. For treating the root of the tongue it is usually sufficient to pass the swab over it in withdrawing it from the mouth each time. In an examination lasting over ten minutes it may be necessary to renew the cocain applications so the surgeon should

EXPLANATION OF X-RAY.
It will be seen that the counter pressure spatula rests in the hypopharynx and the lower blade rests on base of tongue in front of epiglottis. Patient in prone position.

be ready to begin his examination immediately after the patient is ready in order not to waste any time. The anesthetic is rapidly absorbed from this region. The inexperienced surgeon may find it wise to begin his anesthetic with a 5 per cent cocain sprayed into the pharynx and larynx to reduce the reflexes before beginning with the swab. Prejudice against the use of the swab in the larynx is wholly unfounded, except that there should not be much friction used in applying the medicine.

CHOICE OF INSTRUMENT.

A number of instruments have been developed for making the direct autoscopy, but all of them had some marked weakness until Brunings developed the counter pressure instrument. This solved the greatest problem of getting the larynx in a sufficiently nearly straight line with the orifice between the upper and lower mandibles without producing so much pressure as to traumatize the parts.

In this instrument the counter pressure was on the outer surface of the larynx over the adami pomi. Then came Killian's and later still Haslinger's which placed the counter pressure part of the instrument against the pharyngeal wall. This seemed an ideal instrument except that a frame work around the mouth of the autoscope interfered with the passing of instruments by the surgeon into the larynx. And then came Seiffert's instrument which seems to me all that could be wished in an autoscope. (Seiffert was Killian's assistant for a number of years and up to his death.) For while it has all the advantages of the Haslinger instrument, the frame work around its outer entrance has been done away with and it has a large opening on the side for passing instruments without interference and thus the hand of the surgeon does not get before the autoscope interfering with the field of vision. It also has some wires for making extension of the spatulas, thus enabling the surgeon to use the same instrument on both children and adults.

PLACING THE INSTRUMENT.

The patient may be seated or lying down, but I will describe the procedure in the sitting position. Patient should be seated upon a stool, (the back of a chair is in the way), after having removed collar, or other articles that might interfere with motions of the neck. He is then given a towel and told to draw out his tongue between thumb and finger of left hand. The surgeon then places the index finger and thumb of left hand on the upper teeth in such manner as to make a rack through which the autoscope is passed with the blades closed, until the tips rest against the pharyngeal wall. Then the assistant rotates the patient's head backward and paces tension upward on the neck. The operator now rotates the instrument in its anterior-posterior axis as on a pivot, to a vertical or nearly vertical position. This will bring the upper blade into the lower or hypopharyngeal region and the lower blade will be within the larynx. The thumb screw will then separate the blades and produce the necessary counter pressure to bring the larynx forward and even the subglottic regions will be brought directly into the field of light, so that the anterior and posterior commissures and even the under surface of the vocal cords and adjacent regions may be plainly seen.

25 E. Washington St.

THE TRAP-DOOR ESOPHAGOSCOPE.

DR. CHEVALIER JACKSON, Philadelphia.

In the point-sheathed method of dealing with the open safety-pin lodged point upward in the esophagus or tracheobronchial tree, the greatest difficulty has always been encountered in the tendency for the pointed branch of the safety-pin to get hooked over the end of the tube mouth (Fig. 2), resisting for a time, at least, the effort to get it into the tube where withdrawal would be safe. To facilitate and expedite this part of the maneuver, the author devised a trap-door mechanism to open under the recalicitrant point so it would drop into the lumen of the esophagoscope. Rotation of the esophagoscope may sometimes be necessary to complete the trapping of the point. As it would be unsafe to pass an esophagoscope with an opening or a slit, the trap-door mechanism (Fig 1), was devised and was found to work perfectly.

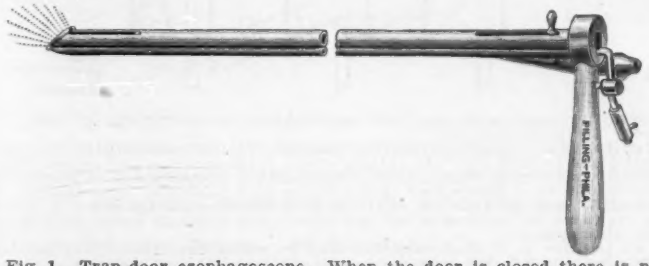

Fig. 1. Trap-door esophagoscope. When the door is closed there is no slit or projection to injure the esophagus. When the level of the pin is reached and the pin is caught, if there is any tendency for the pointed branch of the pin to hang outside the tube-mouth the trap-door is opened with the draw bar to entrap the pointed branch. The trap-door bronchoscope is the same except that the usual breathing holes are added.

In the point-sheathed method the keeper-branch of the safety-pin remains outside the esophagoscope during withdrawal. The rounded keeper slides harmlessly upward alongside the esophagoscope. (See Jackson, Chevalier, Mechanical Problems of Bronchoscopic and Esophagoscopic Foreign Body Extraction, *Journ. Amer. Med. Assn.*, Jan. 27, 1917.

The trap-door bronchoscope is the same in form as the trap-door esophagoscope, with the addition of the usual side holes for breathing. Both are made in the standard sizes.

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In all of this work, of course, the Tucker tack-and-pin forceps are used. Any other kind of forceps would slip off during the maneuver.

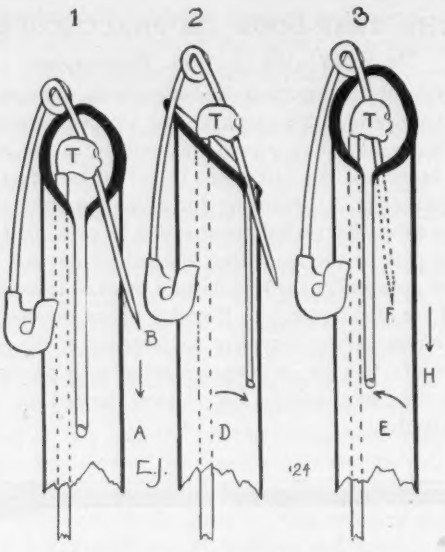


Fig. 2. Trapping the point of a safety-pin with the trap-door esophagoscope (or bronchoscope).

At position 1, is illustrated the tendency of the pointed branch of the safety-pin to hook over the outside of the esophagoscope and resist efforts to get it in during the execution of the author's point-sheathed method of removal of open safety-pins in the air or food passages. Any attempt at withdrawal in the direction of the dart, A, would cause the point, B, to rip in, tear open the esophagus, kill the patient, and probably would not remove the pin anyway

At position 2, is illustrated the way in which the recalcitrant pointed branch drops into the open trap-door slot when the esophagoscope is rotated in the direction of the dart, D. The Tucker forceps, T, will automatically throw the pointed branch into parallelism with the axis of the esophagoscope, either at once or as soon as the esophagoscope is rotated in the direction of the dart, E, back to its original position. Thus the point, F, is sheathed for safe withdrawal in the direction of the dart, H. During these maneuvers the esophagoscope only is rotated. If the point of the pin is buried in the esophageal wall, the forceps, esophagoscope and pin may be moved downward enough to uncover the point; but under no circumstances should any traction be made on the forceps until the point is safely sheathed, and great care should be taken to hold the forceps steady while the tube only is rotated.

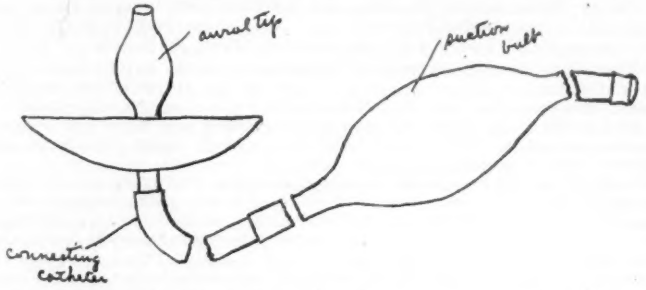
A CORRECTION.

In the February, 1924 issue there appears in the seventh line from the last on Page 160, a typographical error or omission of the decimal point. It appears in Dr. Jarecky's discussion of the iodine powder which I am using in chronic suppurative otitis and should read 0.69% and not 69%. DR. M. D. LEDERMAN.

APPARATUS FOR DOUCHING EAR FOR REMOVAL OF CERUNUM.*

DR. M. L. HARRIS, Brooklyn, New York.

In douching the ear with the aural syringe, frequent refilling of the syringe is necessary, which is apt to be sloppy as well as slow. For some time I have used an apparatus which is simple and can be improvised from any otologist's paraphernalia. It consists of an aural tip attached to ruber tubing which



in turn is connected to a Davison bulb suction tube. To use, the tip is inserted into the external auditory canal and a stream of water is maintained from some handy basin previously filled, until the cerumen is forced out and the water returns clear.

*From Beth Israel Hospital, New York City.

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The Board of Examiners in Oto-Laryngology of the American Academy of Ophthalmology and Oto-Laryngology will convene in Chicago at the North Chicago Hospital, 2551 North Clark street, on Friday, June 13, at 10 A. M., for the purpose of examining candidates for fellowship in the Academy of Oto-Laryngology. This special meeting will be held to accommodate those who find it impossible to attend the regular meeting of the Academy at Montreal in September.

BOOK REVIEW.

Atlas of Otology. Illustrating the Normal and Pathological Anatomy of the Temporal Bone. By Albert A. Gray, M.D., F.R.S.E., F.R.F.P.S.G., Lecturer on Diseases of the Ear, Glasgow University; Surgeon for Diseases of the Ear, Western Infirmary, Glasgow; Honorary Consulting Surgeon for Diseases of the Ear, Nose and Throat, Glasgow Cancer Hospital; President of the Section of Otology, Royal Society of Medicine, 1914-1916; President of the Section of Otology, British Medical Association, 1922; Laureate of the Lenval Prize, International Congress of Otology, Buda-Pesth, 1909; Gold Medallist of the American Academy of Ophthalmology and Otology, 1911. Author of "The Labyrinth of Animals", "The Ear and Its Diseases", "Otosclerosis; Idiopathic Degenerative Deafness", etc. Maclehose, Jackson & Co., Publishers to the University, Glasgow, 1924. Price £6/6, net.

There have been many graphic forms presented to enable the student of otology and of associated sciences to study the details of the temporal bone. These forms have included carefully executed drawings, engravings, reproductions of photographs, some in black and white and a small number in colors. They have been presented in books, in charts and in stereoscopic mounts in series.

In no instance do we recall, however, the production of an atlas in such complete form, in such excellence of stereoscopic photography and in such discriminate selection of subject-matter, in the detail of structure of the temporal bone in its normal and pathological aspects as in the monumental work now presented by Albert A. Gray of Glasgow.

Even as a collection of the normal and pathological status of the temporal bone, selected with the utmost discrimination, the subject-matter of this atlas stands out pre-eminently, but when one emphasizes the fact that the specimens of temporal bones here presented are all the preparation and handicraft of one man it materially enhances the importance and scientific value of this atlas.

As the author states in his preface, "there is no region in the human body so difficult to grasp from the point of view of microscopic anatomy as the temporal bone". This observation is generally accepted and many of the difficulties in the study of the normal and pathological temporal bone that have confronted the student of this field have been the inaccessibility of material, the character and quality of its presentation and the difficulty of securing characteristic examples of its various pathological phases.

In all of the tasks set before him, Dr. Gray has achieved a signal success in the preparation and production of this splendid atlas.

At the Annual Meeting of the American Laryngological, Rhinological and Otological Society, to be held at the Hotel Chase, St. Louis, May 29-31, there will be on exhibit a complete layout of Dr. Jackson's bronchoscopic instruments as made by Geo. P. Pilling & Son, of Philadelphia.

NASHVILLE ACADEMY OF OPHTHALMOLOGY AND OTO-LARYNGOLOGY.

MEETING OF *December 17, 1923.*

Post-Operative Facial Paralysis. Dr. Hilliard Wood.

Dr. Hilliard Wood reported the case of P. B., age 15, F. W. S., who consulted him on April 10, 1914, giving the following history:

Patient has had chronic suppuration of the right middle ear with more or less offensive discharge since she was six months old. Treatment some eight or ten years ago for several months failed to relieve the suppuration Advised operation.

Operation: Operation at St. Thomas Hospital under ether by Dr. Harry Marr. Opened mastoid cells and found pus cavity 1 cm. vertically and 2 cm. transversely. Cavity was full of pus and cario-necrotic tissue. This was cleaned out down to healthy bone. Middle ear opened through aditus and cario-necrotic tissue removed. Tympanic end of Eustachian tube curetted. Remains of hammer removed and wound closed by Panse plastic method. Patient put to bed in good condition. Six hours after operation there was no facial paresis.

April 11, 1914: Eighteen hours after operation there was no facial paresis. Thirty hours after operation there was a possible slight suspicion of paresis on the right side of the face.

April 12, 1914: Forty-eight hours after operation there was a well developed facial paresis on the right side which, however, was not complete. The dressing was immediately changed. Patient put on small doses of bichloride mercury and iodide potash.

April 13, 1914: The facial paralysis remains well developed but is not total. Wound dressed again and seems to be doing well. No fever.

April 30, 1914: Paralysis well developed but not total.

May 31, 1914: No noticeable change in facial paralysis. Patient put on strychnine sulphate grs. 1/30 after each meal.

July 1, 1914: Facial paralysis practically well.

September 1, 1914: Patient has completely recovered from facial paralysis.

Facial Paralysis. Dr. E. L. Roberts.

Dr. E. L. Roberts reported the case of a white married woman, age 21. During the seventh month of pregnancy the patient developed pain in the left ear which continued for ten days, when the drum ruptured. The discharge continued for two or three weeks. The patient then developed paralysis of the left side of the face. On examination, Dr. Roberts found the left drum very red and swollen, with the landmarks obliterated. No visible perforation; no discharge. Tenderness over the left side of the head, worse over the mastoid antrum. No mastoid redness or swelling.

Dr. Roberts did a free paracentesis of the left drum, evacuating blood and pus. Partial relief followed and after two or three days the pain about the left side of the face was gone. The second day after the paracentesis the facial paralysis began to subside and gradually grew better day by day and is now practically well.

November 19, 1923.

Sarcoma of the Tonsil. Dr. Robert Sullivan.

Dr. Robert Sullivan reported the following case: M. F. M., female, aet 3½ years.

History: (Nov. 7, 1923) Four and one-half or five months ago father noticed an enlargement in the right side of the throat in the region of the right tonsil. Since then the growth has gradually increased in size and has recently interfered with breathing. About one month ago the cervical glands, both anterior and posterior, became enlarged. November 6 the growth was opened by a local surgeon, who was under the impression that it was peritonsillar abscess. No pus was found.

Nov. 8, 1923. Examination at St. Thomas Hospital showed the child to be fairly well nourished; she had a normal temperature, normal blood count, urinalysis negative, and Wassermann negative. Externally, posterior cervicals, right enlarged and easily palpable. Anterior cervicals are enlarged and easily seen externally. Inspection of the throat shows an enlargement around the right tonsil which has pushed the tonsil forward and towards the median line. By palpation there is no fluctuation, but the growth feels hard and nodular. Size, about 1½ inches in length x 1 inch in breadth x 1 inch in thickness.

Treatment: Under local anesthesia the posterior cervical lymph nodes were removed and examined by Dr. Terry, who reported a spindle celled sarcoma. The patient was referred to Dr. Howard King for three treatments by deep therapy.

X-ray Treatment: Deep therapy 5x12x60 2mm. al, ½ mm. cu.
12x12

Nov. 8—1 hour front and right side.
Nov. 9—1 hour front and right side.
Nov. 10—1 hour left and back.

Radium—Nov. 13, 300 mg. hrs. (4 needles, 12½ mg. each, buried in tonsil for 6 hours).

DISCUSSION.

Dr. Eugene Orr reported a case of mixed cell sarcoma which he had some two years ago. The patient, a boy of 18, had a tumor, which had completely filled the nasopharynx, which could be seen by anterior rhinoscopy and which came down upon the tongue and soft palate, pushing so far forward that the patient could not eat. This case was relieved by radium treatment and although the patient died several months later from a metastasis to the liver, there was no recurrence of the nasopharyngeal tumor.

Dr. Fred Hasty said that he had known of only three cases of this type. He spoke of a similar case which had come under his observation, in which the condition had been diagnosed and treated as peritonsillar abscess. His first knowledge of the case was when he found the patient in the ward suffering intensely with what was apparently a peritonsillar abscess, which had been opened and which had again closed. With a hemostat he opened the wound at other angles. The next evening there was no improvement in the condition, and upon feeling the mass it was found to be as hard as rock. Dr. Hasty remarked that this experience had given to him a lesson which is well worth learning, *i. e.*, in these masses in the throat it is time well spent to put the finger into the throat and feel of them.

Dr. Hilliird Wood believed that the history should be of great value in making a differential diagnosis. The average peritonsillar abscess is an acute condition of a few days duration, whereas a malignant growth usually requires very much more time in its development.

Dr. Sullivan (closing) said that as the child had already had some difficulty in breathing, some fear had been entertained lest the reaction from the deep ray therapy, together with the swelling in the throat, might produce acute obstruction to breathing. To meet this complication, should it arise, tracheotomy instruments were kept ready, both at the hospital and at the office of Dr. King.

Sarcoma of the Nose. Dr. Hilliard Wood.

Dr. Hilliard Wood exhibited the case of G. B. D., aet 13, male, white, single.

History: Nov. 9, 1923. Nasal obstruction, particularly on the left side, for the past month; mucopurulent discharge. Pain in and above the left eye for past week.

Examination: Left eye: Distinct profuse mucocele; pressure expels a large amount of creamy pus through the inferior canaliculus. No external deformity about eye.

Right ear: Hearing, watch 30 inches)

Left ear: Hearing, watch 30 inches) No visible pathology.

Looking at the face from the front there is a slight fullness on the left side of the nose as compared with the right; this is slight, but positive. Anterior rhinoscopy shows nasal septum slightly bulged to the right, with pus in the rear part of the right nasal fossa and total obstruction to breathing, both inspiration and expiration. On the left side anterior rhinoscopy shows tumor mass filling up left nasal fossa and extending forward to the vestibule. This mass is semi-necrotic, bleeds moderately upon manipulation, is doughy in feeling, is movable, and has an offensive odor. Posterior rhinoscopy shows a fleshy, pinkish-white, semi-necrotic mass filling up the anterior portion of the nasopharynx and completely obstructing both posterior nares in the rear. The tumor mass grows from the left nasal fossa, extends from the vestibule in front, backwards into the nasopharynx, obstructing each choana.

Transillumination shows frontal sinuses and right antrum fairly clear for a child; left antrum relatively dark.

Slight bilateral cervical adenopathy, not more developed on the left side than on the right.

Teeth show some irregularity but no Hutchinson's teeth.

Urinalysis negative. Heart and lungs negative.

Tentative Diagnosis: Sarcoma of the left antrum. Foreign body is excluded.

Treatment: Patient placed in St. Thomas Hospital for Wassermann test and for external operation.

Nov. 10: Blood Wassermann by St. Thomas laboratory reported negative.

Operation at St. Thomas Hospital under ether. A curved incision on the left side of the nose, extending into the nasal fossa, allowed the left side of the nose to be turned over on the right side, using the bridge of the nose as a hinge. This gave a good exposure of the tumor. The tumor mass was very friable and came out piecemeal. It appeared to be attached to the left ethmoid region. The left antrum was opened. The nose was packed with sterile gauze to control bleeding, which was moderate in amount, and the original incision closed with interrupted sutures. The packing was removed at the end of twenty-four hours and the sutures at the end of six days. At the end of eight days the wound had healed and Dr. Carl Crutchfield began the use of radium, which was continued with some interruption for 48 hours. The patient was then allowed to go home, with instructions to return for further radation at the end of six weeks.

Nov. 17, 1923: Dr. B. T. Terry reports the tumor to be apparently a spindle cell sarcoma.

DISCUSSION.

DR. GEORGE H. PRICE asked as to the prognosis in this case. How long between the radium treatments?

DR. WOOD (closing) said that the prognosis, of course, depended upon the virtue of the radium. The interval between applications of radium was left to Dr. Crutchfield, who has charge of ths phase of the treatment.

Sarcoma of the Septum. Dr. E. B. Cayce.

Dr. E. B. Cayce reported the following case: Mrs. W. S. F., aet 45, Memphis, Tenn.

History: Dr. Cayce has seen this case from time to time for several years, with antrum that would occasionally become blocked, but relieved

by relaxing the mucous membrane and the use of suction. There is nothing in the previous history that is of special consequence except the fact that following an attack of influenza three years ago, a tubercular infection was suggested and she was sent to Asheville, N. C., where the chest examination was negative. All of her symptoms disappeared after a few weeks at Asheville.

Sept. 22, 1923, the case was again seen and the left antrum was found dark. Complete relief was obtained by relaxing the middle turbinate and using the suction. Advised draining the antrum permanently if the condition recurred.

Nov. 14, 1923, Dr. Cayce was called, from Memphis, and told that the patient was very uncomfortable. He told them that he was leaving the city and asked that the matter be delayed for one week. A second message, however, stated that the conditions were urgent, so the patient was instructed to come to Nashville. Dr. Cayce saw the patient in the operating chair prepared for an antrum operation, but upon making an examination of the nose, saw an immense thickening in the septum, which gave some appearance of a septal abscess. The only thing was that the mucous membrane was roughened. He made an incision and found the growth solid. A section was removed from the right side and sent to the laboratory, with a diagnosis of suspected sarcoma, which was confirmed by the report sent in by Dr. B. T. Terry. The patient was turned over to Dr. Crutchfield, of Dr. Haggard's staff, and radium was used, with the receding of the growth, and she is now entirely comfortable. As to a recurrence, time only will tell as to whether the cure is complete.

No discussion.

Dacriosystitis. Dr. W. G. Kennon.

Dr. W. G. Kennon showed the case of F. B., female, aet 32, who was admitted to the hospital on Sept. 9, 1923, giving the following history:

Left eye: For the past three or four years has had recurrent swelling, lacrimation and discharge, for which she has had treament at intervals. The condition has been more aggravated for the past five weeks, with inflammation of the eye and puffiness of the lower lid.

Examination: Shows pupils round, reacting eqally to light and accommodation; muscle movements normal. Left eye: sclera and conjunctiva inflamed. Lower lid swollen and inflamed. Ears, nose and throat negative. Teeth in bad condition. Wassermann positive.

Diagnosis: Chronic purulent dacriocystitis.

Treatment: Sept. 10, 1923, did Mosher-Toti combined external and intranasal operation. Patient discharged from hospital following day.

From the day of operation the patient has had no pus in the sac that can be expressed into the nose or conjunctival sac; since two weeks following the operation, no tearing.

Dr. Kennon said that in his opinion this condition was one of the most difficult to be dealt with, the results being in the majority of cases unsatisfactory. The extirpation of the sac has probably more adherents than any other method of treatment, but this is not always absolutely satisfactory. He is inclined to regard the Mosher-Toti operation with great favor.

DISCUSSION.

DR. E. L. ROBERTS asked why this opening could not be made from the outside; and if made from the outside, would it not be possible to get sufficient drainage without removing the middle turbinate?

DR. GEO. H. PRICE questioned whether in view of the fact that the secretion present in these cases is from the lining of the lacrimal sac, is it possible to eliminate all of such secretion by removing only a portion of the sac?

DR. EUGENE ORR, who had assisted in this operation, said that the feature which presented the greatest difficulty was the bleeding from the nose. He believed it would be more satisfactory to do the intranasal work first, under local anesthesia, wait until the patient practically recovers from that, and then proceed from the outside and complete the

operation. This method might prove less annoying so far as bleeding is concerned.

DR. FRED HASTY had also observed this case and said there was no doubt as to its being a genuine case of dacriocystitis—about as severe as he had ever seen. He regards this operation with great favor.

DR. KENNON, (closing) answered Dr. Roberts, said that there was no reason why this could not be done from the outside except the necessity for working around a corner. In removing the ethnoids and middle turbinate it would be rather difficult to work with anything except an angular instrument. As to the removal of the middle turbinate, he believed this to be necessary in view of the fact that the location is rather crowded and the development of granulations in any operation on any of the nasal sinuses is a very annoying proposition, particularly where the space is small; so that better results will be obtained where more space can be had. As to Dr. Price's point, he stated that it was simply a question of drainage. Lacrimal suppuration persists for the same reason as does the discharge from a chronic antrum—because the drainage is inadequate. The etiology in these cases is probably first having an obstruction in the nasolacrimal duct and then getting infection. If that obstruction could be relieved sufficiently to get free drainage, no difficulty would be experienced in relieving cases of lacrimal abscess. This, however, cannot be done. The nasolacrimal duct is so small and so tortuous that it cannot be operated upon with any degree of satisfaction.

Cerebellar Abscess. Dr. E. B. Cayce.

DR. E. B. CAYCE reported the following case: Mr. O. B. C., age 24, white, referred by Dr. Taylor of Jacksonville, Fla., and Dr. Dossett of Tullahoma, Tenn.

The patient was first seen by Dr. Cayce on December 17, 1923. He complained of severe frontal and occipital pain.

Previous History: Patient had been examined by Dr. Washburn and Dr. Taylor. X-ray plates made by Drs. Cunningham and Shaw and a neurological examination made by Dr. Greene. The X-ray film was sent with the notation by Cunningham and Shaw that "the right ethmoidal structure just beneath the frontal shows some thickening, indicating a chronic process. The right lacks in transparency, but shows no change in the structure of the wall, which suggests the probability that there might be fluid in the right antrum." Dr. Washburn removed the anterior end of the middle turbinate.

He saw Dr. Taylor on Dec. 3. At that time he was suffering with severe pain over the right frontal sinus. Dr. Taylor attempted to explore the right frontal sinus, but the patient suffered very severe paroxysms of pain with the least pressure. Consultation was called and a neurological examination was made by Dr. Greene, as well as X-ray of sinuses, spinal puncture, etc. From the reports submitted the case was most thoroughly worked out.

Subsequent History: When Dr. Cayce saw the case it seemed to be a case of vacuum frontal sinus, and this was the tentative diagnosis. The patient was shown that evening at the meeting of the Nashville Academy of Ophthalmology and Oto-Laryngology. Dr. Jere Caldwell suggested that this might be a tic. On Dec. 18, under cocain, preceded by scopolamin, gr. 1/100; morphia, gr. 1/4; and atropia, gr. 1/150, the frontal sinus was opened. It was necessary to break down some heavy ethmoid cells before the antrum could be entered. The antrum was found negative. On Dec. 22, the sphenopalatine was injected with alcohol according to the Sluder technique. The relief was only temporary from the pain above, but the frontal pain was almost entirely relieved. The ganglion was reinjected on Dec. 25, thinking possibly the Vidian branch had been missed.

On Dec. 23 Dr. A. W. Harris was called in consultation. No diagnosis was made by him but he did not think it was a tic, as only the first branch of the fifth nerve was involved.

Dr. Cayce thereupon wrote Dr. Sluder, giving the symptoms briefly, and Dr. Sluder replied, stating it looked more like a sphenoid. On

Jan. 2, 1924, the ostium of the sphenoid was exposed and enlarged and appeared normal.

Jan. 4 the patient returned to his home in Lewisburg, Tenn. Jan. 7 Dr. Wheat called, saying that the patient was growing rapidly worse. The right eye showed a complete third nerve paralysis and projectile vomiting had occurred. Dec. 8, he called and stated that the patient had died at 5 a. m.

After much effort permission for a post-mortem was secured, and Drs. Cayce, J. L. Bryan and Herman Spitz went to Lewisburg. (See Dr. Spitz's report below.) There Dr. Cayce learned an incident in the history that had not been previously mentioned, i. e., about six weeks before the patient's headaches began he had an infection in the palm of the right hand. He was confined at home for several days and for three days his temperature was high. The most plausible explanation is that he had a mild blood stream infection that localized in the cerebellum. There was increased temperature only once, which was removed by a cathartic. There were absolutely no localizing symptoms. Without a post-mortem a diagnosis would never have been made.

REPORT OF DR. HERMAN SPITZ.

Scalp opened by lateral incision extending from ear to ear. Flaps loosened and pushed forward over frontal bone, and backward over occiput, exposing the cranium. Combined circular and V-shaped saw cut to remove calvarium. For ½ inch on either side of midline and extending for approximately 2 inches, a bright red area is seen on inner side of vault. The tables of the skull are unusually thick, averaging approximately 1 cm. The dura is smooth, but all of the surface vessels are engorged and in the center and on either side of the longitudinal sinus (an area equal to that seen on inner table of skull) is a rough, bright area which feels gritty, but not like pacchionian bodies. The dura was opened along the longitudinal sinus and the brain lifted out of the cranium, loosening it by gentle manipulations commencing at the frontal lobes and working backwards. The cranial nerves were severed as they were encountered. When the cerebellum was reached the dissecting finger pushed into a soft mass from above and brought out some soft degenerated material. Upon removing the brain and exposing the cerebellum it was found to contain an abscess approximately 7.5 cm. (2½ in.) in diameter, which had ruptured through the upper surface into a space limited by the tentorium cerebelli. Several cultures from the abscess showed staphylococci. The lateral ventricles were not greatly enlarged. The vessels at the base of the brain were engorged. Th tops of the ethmoid and frontal sinuses, together with the roof of the sphenoid, were exposed. The right ethmoid and frontals were dry. The left were filled with rather fresh fibrin and serum. The sphenoid contained the same material.

Symposium on Facial Paralysis of Toxic Origin. Dr. M. M. Cullom.

Dr. M. M. Cullom reported the case of F. G. S., aged 20, who consulted him on April 11, 1921. Patient stated that on April 9 he discovered on awakening in the morning that he could not close his left eye and that the right side of his face was drawn. He had a well developed case of facial paralysis on the left side.

Routine examination revealed the fact that the tonsils were very large and very much diseased. It was suggested that a tonsillectomy be done, not, however, with any idea of benefitting the facial paralysis. On Monday, April 14, a local tonsillectomy was done before the Eye, Ear, Nose and Throat Section of the State Society. On the following morning it was noticed that the facial paralysis had entirely disappeared.

Dr. Cullom stated that as this was the first case he had heard of he did not report it as he reasoned it might be merely a coincidence. It has developed since, however, that a number of cases have been observed among the specialists in Nashville, so that it is believed that all known cases should be made a matter of record. It is highly interesting if it should develop that many cases of facial paralysis are toxic in origin

and that the removal of the focus of infection will result in the clearing up of the paralysis.

Dr. Cullom stated that he knew of one case in which the facial paralysis failed to clear and the patient was known to have very badly disease tonsils, which were finally removed some years after on account of the development of a heart lesion.

Dr. Hilliard Wood reported three cases:

1. Dr. S. E. G., aet 47, who was first seen June 28, 1915.

History: History of pyorrhea and rheumatism and some tonsillitis. Facial paralysis right side developed June 24.

Examination: Complete paralysis right seventh nerve. Moderate pyorrhea. Three loose teeth. Enlarged and septic faucial tonsils. Blood pressure: 120-80. Urinalysis negative.

Treatment: Had teeth X-rayed. Removed faucial tonsils under cocain novocain anesthesia. There was considerable pus and many adhesions, showing previous inflammations.

Jne 29, X-rays show severe pyorrhea but failed to show any abscess in tooth roots. Several teeth removed.

Sept. 15, facial paralysis much improved.

Oct. 1, facial paralysis completely recovered.

2. Mrs. W. S. H., aet 56, who was first seen on Nov. 11, 1923.

History: Oct. 8, 1923, left facial nerve paralyzed; no illness otherwise. Paralysis has since continued. Soreness about left ear and left side of face. No otitis.

Nov. 7, developed vertigo; nausea, no vomiting; headache; no fever; no hemiplegia. Teeth were septic and were removed one or two weeks ago.

Examination: R. E. H., watch 6 inches, voice 18 feet; L. E. H., watch 1 inch, voice 15 feet. Ears present no visible pathology. Nose, antra, frontal sinuses normal. Faucial tonsils septic plus two. Partial facial paralysis left side. Urinalysis negative. Advised local tonsillectomy. tonsillectomy.

Treatment: Nov. 12, removed faucial tonsils under local anesthesia. Prescribed sodium salicylate.

Nov. 19, prescribed mixed treatment in one prescription.

Nov. 23, facial paralysis and vertigo improved. No vertigo when one eye is closed.

Dec. 12, patient seems almost well of paralysis.

Jan. 5, 1924, facial paralysis practically well.

3. Mr. J. I. C., aet 47, who was first seen Dec. 3, 1923.

History: Left side face, partial paralysis. Came on gradually last week Sight not affected. No rheumatism. Very little trouble with throat. Singing in left ear for three or four years.

Examination: Well developed paralysis left facial nerve.

R. E. Hearing, watch 15 inches; L. E. Hearing, watch 6 inches; no visible auditory changes.

Transillumination shows frontal sinuses and right antrum clear. Left antrum shows positive shadow. Four teeth are crowned and several others decayed and septic. Extreme deviation of the nasal septum to left. Left antrum irrigated—no pus found.

Treatment: Did a local tonsillectomy. Prescribed salicylate soda in absence of pepsin.

Dec. 23, prescribed mixed treatment in one prescription.

Jan. 8, 1924, paralysis much improved. No teeth have been extracted. Directed to continue mixed treatment for 10 days and then take strychnin grains 1/15 p.c.

Dr. J. Leslie Bryan reported the following cases:

1. T. W., male, aet 20.

History: Young man well developed; no illness; no injury; previous history negative. About March 1, 1921, developed a paralysis of left side of face.

Examination: Eye grounds normal. Nose: very large, passages narrow. Septum: marked deviation to left, high, pressing on middle turbi-

nate. Turbinates: inferior hypertrophied. Mucous membrane: clean. no purulent discharge. Sinuses: no pain, no tenderness on pressure, transillumination clear. Mouth and teeth in good condition. Throat and tonsils hypertrophied and diseased Larynx normal. Physical examinations negative. Wassermann negative.

Treatment: March 28, 1921, a submucous resection was done. The paralysis cleared up in less than one week's time. Up to the present date there has been no return.

2. H. W., aet 16, seen on June 18, 1922.

History: Young man well nourished, well developed, previous history negative with exception of some trouble with tonsils. About two weeks before coming to see Dr. Bryan, developed paralysis of right side of the face, which had shown no tendency to clear up.

Examination: Eye grounds normal. Septum deviated both ways. Turbinates slightly hypertrophied. Sinuses: Transillumination clear, no tenderness on pressure, no headaches. Ears normal. Mouth and teeth in good condition. Tonsils: medium in size, diseased, posterior pillars very hallow. Physical examination and Wassermann negative. Paralysis thought to be toxic. Tonsillectomy advised.

Treatment: Tonsillectomy done the same day under butyn anesthesia. There was very little bleeding, no pain. After operation the paralysis cleared up in less than thirty days.

3. A. J., aet 25, Jan. 17,, 1924.

History: Previous history negative with the exception of an acute attack of gonorrhea, Feb., 1923, which cleared up in two months under treatment, with a return about Thanksgiving of the same year. Dec. 24, 1923, had headaches and sensation of numbness, tingling and drawing in left side of face. Next morning when awakened found left side of face paralyzed.

Examination: Eye grounds normal.

Ears normal. Nose: septum deviated high to right and to left in middle. Turbinates: hypertrophied and catarrhal, mucous membranes covered with viscid, mucopurulent secretion. Sinuses: transillumination clear, no pain, no tenderness on pressure. Mouth and teeth in bad condition. Tonsils: medium in size, large crypts and diseased. Physical examination negative. Wassermann four plus by two antigens. Patient referred to genito-urinary specialist.

1. Miss J. P., aet 18, first seen on Sept. 27, 1923.

History: There is nothing in the past history that would have any bearing on the case. Patient has always enjoyed good health and other than the usual diseases of childhood, has always been well. One week before consulting Dr. Cayce, patient noticed inability to close the right eye. The facial paralysis increased until he saw her, Sept. 27, 1923.

Examination: Patient had diseased tonsils. General physical examination negative. Advised tonsillectomy.

Treatment: The tonsils were removed. The facial paralysis, which had been complete at the time of operation, was almost entirely relieved within twenty-four hours and within a week every vestige of it had disappeared.

2. Miss O. K. Referred by Dr. Fenn. Seen Oct. 12, 1923.

The previous history had no bearing on the case. Had an attack of tonsillitis two weeks before Dr. Cayce saw her. Three days previous to that time she noticed the left eye did not close and had some discomfort in eating. When seen the paralysis was almost complete. Tonsillectomy was done Oct. 13. As soon as the throat healed she was given potassium iodid with tonic dose of mercury. The facial paralysis cleared up entirely in three weeks.

3. Miss C. C., aet 18. Referred by Dr. Boyd Bogle.

The only thing of interest in the history was that while training for nursing at Baylor University, Dallas, Texas, patient had several attacks of acute tonsillitis and was never free of the acute condition long enough to have a tonsillectomy done. The general physical examination was negative. Four days before consulting Dr. Cayce she had severe pain

in the back of the neck, and her father, who is a dentist, found the third molar on the right side was erupting. The next day noticed slight facial paralysis on the left side, which continued to increase and when seen the paralysis was complete. The taste on both sides of the tongue was about equal. A tonsillectomy was advised and done Jan. 3, 1924. The condition is improving and the patient is able to close the eye and it looks as if it will be only a short time until she is entirely relieved.

Dr. Cayce stated that there is a tendency in all these acute conditions toward recovery and it is impossible to say that they would not clear up if nothing were done, but it is significant that the healing was so prompt after the removal of the focus of indection.

DISCUSSION.

DR. HERSCHELL EZELL reported having had a case of facial paralysis without ear involvement, which had cleared up following a tonsillectomy; also another similar case in which the tonsils were not removed and in which the paralysis did not recover. While he believes that many of these cases which are not of otitic origin may be due to diseased tonsils, yet he warns against being over-enthusiastic, as there are many other possible causes.

DR. E. L. ROBERTS had not had any cases of facial paralysis to recover after removal of the tonsils, yet he did recall a patient, young girl, on whom he did not do tonsillectomy and in which case the paralysis was not relieved.

DR. EUGENE ORR also pointed out the necessity for bearing in mind the fact that all cases of facial paralysis of the type under discussion are not due to tonsil infection as there are many other causes which are capable of producing toxic symptoms. He gave two illustrations along this line:

1. The case of a man in which the facial paralysis was complete and in which all findings, including a Wassermann, were negative. The paralysis cleared up in five or six weeks.

2. He reported a second case with a four plus Wassermann and a facial paralysis.

Pre-Operative Facial Paralysis. Dr. J. Leslie Bryan.

Dr. J. Leslie Bryan reported the following case:

Miss O. M. F., aet 11. Two years ago had a breaking down of the anterior cervical glands, the condition being diagnosed as tuberculosis of the glands. These were opened and drainage continued for fourteen months. General health has been good since. November, 1923, developed pains in the left ear and in the back of the neck, the pain, however, not being severe. A few days later she developed severe cold, with aching over the entire body. About Dec. 1 the pain in the left ear became quite severe and two or three days later a purulent discharge was noticed. The usual home remedies were used without success.

Examination: (Dec. 21, 1923.) Left external auditory canal normal. Drum membrane slightly inflamed, medium-sized perforation in the lower posterior quadrant, slight purulent discharge. Mastoid: no swelling, no external inflammation, slight tenderness on deep pressure over the antrum; marked tenderness over the tip extending down to a swollen, tender and inflamed gland just below the tip and under the anterior margin of the sterno-mastoid muscle. Dizziness when sitting, standng or walking, relieved by the recumbent position. Slight nystagmus to the left. Temperature 101⅗°, pulse 80, respirations normal. A diagnosis of acute mastoiditis was made.

Treatment: Gastrointestonal cleansing, liquid diet, aural irrigations of hot salin for 20 minutes in every hour.

Dec. 22, the condition was apparently improved, temperature 100°, pulse 80, tenderness greatly diminished. The swelling and tenderness of the gland disappeared in 48 hours. The child was up, dressed and playing on the twenty-fourth.

Dec. 26, notice facial paralysis left side, also sagging of the postero-superior wall of the canal. No pain, no tenderness, no inflammation, very slight discharge.

Dec. 31, X-ray reports the entire left mastoid area is denser than the right and there is a beginning destruction of cells on the left side. The right mastoid shows no variation from normal.

Jan. 2, patient placed in the Protestant Hospital for operation.

Jan. 3, simple mastoidectomy done under ether, assisted by Dr. F. E. Hasty. The cells extended over and posterior to the lateral sinus and were filled with a gelatinous substance. The antrum was filled with granulations and a small amount of pus; the tip cell contained pus. The cells were soft and easily broken down. In the anterior wall of the tip was found a small perforation, which Dr. Bryan believes accounts for the paralysis.

Jan. 4, recovery from the paralysis almost complete, if not entirely so. Patient is making an uneventful recovery.

Dr. Bryan emphasized the following interesting points in this case:

(1) The tuberculous history, which had made him fearful that the wound would be slow in healing.

(2) The process had been rather extensive for a child of this age.

(3) The cells were filled with a gelatinous material, but very little pus was found. The perforation, however, was found in the anterior portion of the tip where the greatest amount of pus was present.

(4) The fact that this facial paralysis and sagging of the wall had developed after the trouble with the gland had subsided and after the ear trouble was apparently recovering under the hot salin irrigations.

DISCUSSION.

DR. FRED E. HASTY, who had assisted in this operation, said that he had predicted that the trouble would probably be found below the external semicircular canal. In acute mastoiditis facial paralysis is due to one of three conditions:

(1) Dehiscences above the semicircular canal. (2) Destruction over or approaching the facial nerve external to the semicircular canal. (3) Swelling of the gland just as the nerve emerges from the bony canal. In this case, as in a majority of those he has seen, there was exposure of the facial nerve external to the semi-circular canal.

DR. EUGENE ORR believes that in these acute conditions the main thing is to operate early, because they are usually due to some sinus running down into the canal that carries the nerve. He reported a case in which the external auditory canal was filled with cholesteatoma and upon which a radical mastoid operation was done, the nerve being cut at some time during the operation. Later the patient developed an abscess in the neck. After supplementary operations the conditions cleared up except for a sinus in the neck. Several weeks later the patient complained of sore throat. Examination revealed apparently a peritonsillar abscess. Upon making the incision a strand of thread was noticed and upon pulling this thread with forceps a piece of gauze about two inches in length was withdrawn. Questioning revealed the fact that the patient had had a peritonsillar abscess opened some twelve to fifteen years before and that the wound had been packed to promote drainage. The question then was whether this gauze had been present for these twelve or fifteen years, or whether it had in some way worked in from the mastoid operation. Dr. Orr was inclined to believe that the latter was true. The ear condition eventually cleared up, but the facial paralysis remained.

DR. M. M. CULLOM suggested that Dr. Bryan's case might possibly have been due to toxic conditions rather than through the medium of the perforation.

February 18, 1924.

Foreign Body Removed from Esophagus. Dr. Herschel Ezell.

Dr. Herschell Ezell reported the following case: On Oct. 20, 1923, Mr. D. E. S., aged 48, of Westmoreland, Tenn., was suddenly choked while eating lunch. He at once discovered that he had broken his upper plate and had swallowed the smaller part. The family physician, Dr. T. Y. Carter, was called and advised the patient to go to Nashville to see a throat specialist.

The patient arrived at my office about 6 p. m. He was unable to swallow food, but could swallow water with difficulty. Examination with a laryngeal mirror and palpation of the throat revealed nothing. A fluoroscopic examination by Dr. H. S. Shoulders located the partial plate opposite the fourth dorsal vertebra. With this information I returned to my office, cocainized the throat with 5 per cent cocain solution, passed the esophagoscope, and removed the plate. (Plate displayed.) The patient had no trouble and returned home the same night.

DISCUSSION.

DR. E. B. CAYCE complimented Dr. Ezzell upon the rapidity and ease with which this foreign body was removed. He has in his collection two similar plates which he has removed. In the first case an effort had been made by the general practitioner; the patient had an esophagititis of several days duration. The second patient had practicily no symptoms other than sore throat.

Dr. Cayce believed that in the future more cases of this character would be met with than formerly, in view of the fact that so many removable bridges are now being worn, the clasps of which may become loosened. He thinks that a note of warning should be sounded by the dentists, who should particularly caution their patients to remove plates at night.

Radical Mastoid—Death. Dr. E. L. Roberts.

Dr. E. L. Roberts reported the following case: The patient, a girl 17 years of age, first consulted him Jan. 5, 1924, at which time her complaint was headache.

History: Patient has six brothers and sisters, all living and well. Her parents are living. Right ear: Suppurative otitis media since the age of five, with the exception of eight months three years ago. Dec. 24, 1923, patient developed nausea, vomiting, headache, and rather free bowel action. The nausea and vomiting subsided after six or seven days, but the headache continued.

Examination: Temperature 100⅘°. Pulse 90. Left pupil somewhat dilated and left external rectus paralyzed. Both discs clear, but the right became hazy six or seven days later. Appetite fair. Tongue coated. Bowels inactive. Examination revealed a little tenderness over the mastoid; drum head red; large perforation below. Spinal rigidity. Patient walked to the X-ray room but her gait was not steady and she required assistance. X-ray showed the mastoid sclerotic. On spinal puncture the fluid came out with considerable force. It was clear, and was reported negative by Dr. Jones at this time and again four days later. After the spinal puncture was done the patient complained no more of headache. Wassermann negative. Widal negative. Blood count 9,200. Urinalysis negative except for excess of phosphates. Hearing of the affected ear was watch at two inches. No nystagmus. No vertigo.

Treatment: Did radical mastoid operation on the right side, but found very little pathology. The antrum was the only cell in the mastoid and it was no larger than a pea. The bone over the lateral sinus was removed and found apparently in perfect condition. Since the first day the patient had been growing gradually worse, the temperature ranging around 101°, and the pulse about 90 to 100, but the operation seemed not to aggravate her condition especially, although it did not improve it. A day or so after this the right optic disc became somewhat indistinct. On Jan. 12, Dr. S. S. Crockett saw her and thought she had brain abscess, and advised opening over the tempero-sphenoidal lobe, which was done. However, nothing whatever was found to indicate abscess. Jan 13, the temperature went up to 103⅘°, pulse 110. Jan. 14, they continued about the same and the patient became unconscious at 8 or 9 a. m., and died at 3 p. m. A postmortem was earnestly requested, but was declined.

DISCUSSION.

DR. FRED HASTY remarked that brain complication without localizing signs or symptoms is always a very trying and puzzling situation. The paralysis of the external rectus involving the sixth nerve brings up two conditions: *i. e.*, involvement of the tip of the mastoid bone and basilar meningitis. Paralysis of the sixth nerve is also frequently found in

tuberculous meningitis. Dr. Hasty pointed out several interesting features about this case. The ossicles were intact, although there had been a discharge for a period of several years. This brings to mind the possibilities of otorrhea really due to some trouble in the nose, sinuses, or throat. She had evidently had considerable inflammation of the mastoid at some time, because she had sclerosis. She of course had considerable pressure. Dr. Hasty inquired what test of the spinal fluid was made. Dr. Roberts replied that a culture had been made. Dr. Hasty was of the opinion that a differential cell count might possibly have given some information as to tuberculosis in this case.

DR. W. G. KENNON was inclined to think strongly of the possibility of tuberculous meningitis unless more information could have been obtained as to the spinal fluid.

Acute Syphilis Involving the Eighth Nerve. Dr. Fred Hahty.

Dr. Fred Hasty reported the case of W. B. G., who contracted syphilis in March. Active treatment was begun some six to eight weeks later. Following the sixth dose of salvarsan the patient was dizzy for a few days, equilibrium was disturbed to the extent of staggering occasionally. This passed away within a week's time, but as the dizziness decreased he observed that the hearing in the right ear was somewhat impaired. Total deafness in this ear developed within four weeks. On examination the ear drum was practically normal in appearance. There was no bone nor air conduction. This examination was mde some three months after the time when total deafness developed.

Dr. Hasty said that formerly such conditions were considered to be due to the salvarsan rather than to the syphilitic condition. Later, however, the consensus of opinion seems to be that they are due to the syphilis and not to the arsenical treatment, the idea now being to push the antisyphilitic treatment.

DISCUSSION.

DR. W. G. KENNON believed that syphilitic involvement of the eighth nerve must be a very rare condition. He does not recall having seen a case since he has been in private practice. He has seen one case of sudden deafness which was inexplicable, but not one of syphilitic origin.

DR. E. B. CAYCE thought this condition to be syphilitic. He remarked that formerly before giving any of the arsenics the patient was usually sent around for a fundus examination and if the fundus showed any changes at all treatment was withheld. It has been found, however, that cases showing eye lesions are the ones that need treatment a little more heroically than the average case, which bears out the fact that it is syphilis that causes the lesion rather than the arsenical tretment.

DR. J. LESLIE BRYAN had seen one case of this type about three years ago.

DOCTOR T. PASSMORE BERENS.

Doctor T. Passmore Berens died at his residence, 31 Park Avenue, New York City, on December 27, 1923. He was born in Philadelphia on March 27, 1866, and was the son of the late Doctor Bernard Berens.

Doctor Berens attended the Friends' School and Rugby Academy, Philadelphia, then he entered the Academic Department of the University of Pennsylvania, and after two years matriculated the University of Pennsylvania, Medical School, from which he was graduated in 1887. During the years 1887 and 1888, he was an interne at the Philadelphia Hospital and from 1888 to 1890, he did post-graduate work in Vienna and Berlin. He began practice in New York City in 1890, specializing in oto-laryngology. He became connected with the Manhattan Eye, Ear and Throat Hospital in 1890, and at the time of his death was surgeon and a director of the hospital.

In 1914 and 1915, Doctor Berens was professor of Otology of the New York Polyclinic Post-Graduate Medical School and Consultant Otologist of the New Rochelle and St. Bartholomew's Hospitals. He was a Fellow of the American College of Surgeons, a member of the American Medical Association, the American Laryngological Association, the American Otological Society, the American Laryngological, Rhinological and Otological Society, the New York State Medical Society, the New Rochelle Medical Society, a Fellow of the Academy of Medicine and an ex-president of the New York County Medical and of the Medical Surgical Societies. He was a member of the Canadian Club and the Orchard Lake Club.

He served with distinction during the World War, and from January 5 to December 6, 1918, he was surgeon in charge with rank of Major of the Otological and Laryngological Service, U. S. A. General Hospital, No. 1, at Williamsbridge, New York. In July, 1919, he re-entered the Medical Officers' Reserve Corps with the rank of Lieutenant-Colonel.

His life was one of service and devotion to his profession, and a large part of his time was given in the interest of the Manhattan Eye and Ear Hospital.

He was a skillful surgeon as well as a contributor to the literature of oto-laryngology. Among his contributions were monographs concerning:

An Operation for the Correction of External Deformities of the Bridge of the Nose.

Complications of Chronic Suppuration of the Middle Ear. Aetiology and Diagnosis.

Results of Operations by Way of the Maxillary Route for Combined Disease of the Maxillary Antrum, Ethmoid Labyrinth and Sphenoid Sinus.

Abscess of Frontal Lobe of the Brain, of Otic Origin, with Exhibition of Specimens.

Brain Abscess from Chronic Suppuration in the Frontal Sinus. Case Report.

Fourteen Cases of Chronic Multiple Sinusitis (Maxillary Antrum, Ethmoid Cells and Sphenoid Sinus) Operated Upon by Way of the Maxillary Route.

Ambulant Otitic Meningitis..

The Comparative Results of Conservative and Radical Methods of Treatment of Disease of the Sphenoid Sinus.

Report of Two Cases of Cerebrospinal Meningitis Presenting No Central Nervous Phenomena Until Shortly Before Death.

A case of Primary Carcinoma of the Trachea.

Hemilaryngectomy for Epithelioma; Exhibition of the Patient.

He is remembered by his colleagues as a true friend and helpful advisor and loved by his patients for his skill and sympathy.

DR. CONRAD BERENS.